

EXHIBIT 4

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(12) **United States Patent**
Lambourne

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(54) **ZONE SCENE MANAGEMENT**

(56) **References Cited**

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U.S. PATENT DOCUMENTS

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3,956,591 A 5/1976 Gates, Jr.
4,105,974 A 8/1978 Rogers
(Continued)

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FOREIGN PATENT DOCUMENTS

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CA 2320451 A1 3/2001
CN 1598767 A 3/2005
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OTHER PUBLICATIONS

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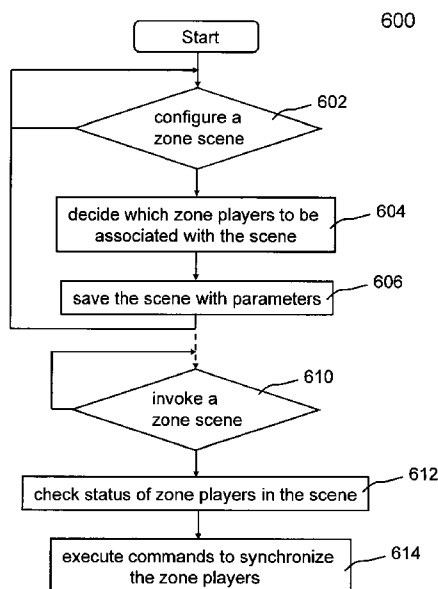
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(57) **ABSTRACT**

An example computing device in a media playback system receives a first request to create a first zone scene including a first preconfigured grouping of zones including a first zone and a second zone, and based on the first request, causes creation and storage of the first zone scene. The computing device receives a second request to create a second zone scene including a second preconfigured grouping of zones including the first zone and a third zone, and based on the second request, causes creation and storage of the second zone scene. While displaying a representation of the first zone scene and a representation of the second zone scene, the computing devices receives a third request to invoke the first zone scene, and based on the third request, causes the first zone scene to be invoked such that the first zone and the second zone become configured for synchronous playback of media.

20 Claims, 13 Drawing Sheets



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See application file for complete search history.
- (56) **References Cited**
U.S. PATENT DOCUMENTS
- | | | | | | | | |
|-----------|---|---------|-----------------|-----------|---|---------|-------------------|
| D260,764 | S | 9/1981 | Castagna et al. | 5,185,680 | A | 2/1993 | Kakubo |
| 4,296,278 | A | 10/1981 | Cullison et al. | 5,237,327 | A | 8/1993 | Saitoh et al. |
| 4,306,114 | A | 12/1981 | Callahan | 5,239,458 | A | 8/1993 | Suzuki |
| 4,382,158 | A | 5/1983 | Ohshita et al. | 5,272,757 | A | 12/1993 | Scotfield et al. |
| 4,509,211 | A | 4/1985 | Robbins | 5,299,266 | A | 3/1994 | Lumsden |
| D279,779 | S | 7/1985 | Taylor | D350,531 | S | 9/1994 | Tsuji |
| 4,530,091 | A | 7/1985 | Crockett | D350,962 | S | 9/1994 | Reardon et al. |
| 4,696,037 | A | 9/1987 | Fierens | 5,361,381 | A | 11/1994 | Short |
| 4,701,629 | A | 10/1987 | Citroen | 5,372,441 | A | 12/1994 | Louis |
| 4,712,105 | A | 12/1987 | Kohler | D354,059 | S | 1/1995 | Hendricks |
| D293,671 | S | 1/1988 | Beaumont | D354,751 | S | 1/1995 | Hersh et al. |
| 4,731,814 | A | 3/1988 | Becker et al. | D356,093 | S | 3/1995 | McCauley et al. |
| 4,816,989 | A | 3/1989 | Finn et al. | D356,312 | S | 3/1995 | Althans |
| 4,824,059 | A | 4/1989 | Butler | D357,024 | S | 4/1995 | Tokiyama et al. |
| D301,037 | S | 5/1989 | Matsuda | 5,406,634 | A | 4/1995 | Anderson et al. |
| 4,845,751 | A | 7/1989 | Schwab | 5,430,485 | A | 7/1995 | Lankford et al. |
| D304,443 | S | 11/1989 | Grinyer et al. | 5,440,644 | A | 8/1995 | Farinelli et al. |
| D313,023 | S | 12/1990 | Kolenda et al. | D362,446 | S | 9/1995 | Gasiorek et al. |
| D313,398 | S | 1/1991 | Gilchrist | 5,457,448 | A | 10/1995 | Totsuka et al. |
| D313,600 | S | 1/1991 | Weber | D363,933 | S | 11/1995 | Starck |
| 4,994,908 | A | 2/1991 | Kuban et al. | 5,467,342 | A | 11/1995 | Logston et al. |
| 4,995,778 | A | 2/1991 | Bruessel | D364,877 | S | 12/1995 | Tokiyama et al. |
| D320,598 | S | 10/1991 | Auerbach et al. | D364,878 | S | 12/1995 | Green et al. |
| D322,609 | S | 12/1991 | Patton | D365,102 | S | 12/1995 | Gioscia |
| 5,086,385 | A | 2/1992 | Launey et al. | D366,044 | S | 1/1996 | Hara et al. |
| D326,450 | S | 5/1992 | Watanabe | 5,481,251 | A | 1/1996 | Buys et al. |
| D327,060 | S | 6/1992 | Wachob et al. | 5,491,839 | A | 2/1996 | Schotz |
| 5,151,922 | A | 9/1992 | Weiss | 5,515,345 | A | 5/1996 | Barreira et al. |
| 5,153,579 | A | 10/1992 | Fisch et al. | 5,519,641 | A | 5/1996 | Beers et al. |
| D331,388 | S | 12/1992 | Dahnert et al. | 5,533,021 | A | 7/1996 | Branstad et al. |
| 5,182,552 | A | 1/1993 | Paynting | D372,716 | S | 8/1996 | Thorne |
| D333,135 | S | 2/1993 | Wachob et al. | 5,553,147 | A | 9/1996 | Pineau |
| | | | | 5,553,222 | A | 9/1996 | Milne et al. |
| | | | | 5,553,314 | A | 9/1996 | Grube et al. |
| | | | | D377,651 | S | 1/1997 | Biasotti et al. |
| | | | | 5,596,696 | A | 1/1997 | Tindell et al. |
| | | | | 5,602,992 | A | 2/1997 | Danneels |
| | | | | 5,623,483 | A | 4/1997 | Agrawal et al. |
| | | | | 5,625,350 | A | 4/1997 | Fukatsu et al. |
| | | | | D379,816 | S | 6/1997 | Laituri et al. |
| | | | | 5,640,388 | A | 6/1997 | Woodhead et al. |
| | | | | D380,752 | S | 7/1997 | Hanson |
| | | | | 5,652,749 | A | 7/1997 | Davenport et al. |
| | | | | D382,271 | S | 8/1997 | Akwiwu |
| | | | | 5,661,665 | A | 8/1997 | Glass et al. |
| | | | | 5,668,884 | A | 9/1997 | Clair, Jr. et al. |
| | | | | 5,673,323 | A | 9/1997 | Schotz et al. |
| | | | | D384,940 | S | 10/1997 | Kono et al. |
| | | | | D387,352 | S | 12/1997 | Kaneko et al. |
| | | | | 5,696,896 | A | 12/1997 | Badovinatz et al. |
| | | | | D388,792 | S | 1/1998 | Nykerk |
| | | | | D389,143 | S | 1/1998 | Wicks |
| | | | | D392,641 | S | 3/1998 | Fenner |
| | | | | 5,726,989 | A | 3/1998 | Dokic |
| | | | | D393,628 | S | 4/1998 | Ledbetter et al. |
| | | | | 5,740,235 | A | 4/1998 | Lester et al. |
| | | | | 5,742,623 | A | 4/1998 | Nuber et al. |
| | | | | D394,659 | S | 5/1998 | Biasotti et al. |
| | | | | 5,751,819 | A | 5/1998 | Dorough |
| | | | | 5,761,320 | A | 6/1998 | Farinelli et al. |
| | | | | 5,774,016 | A | 6/1998 | Ketterer |
| | | | | D395,889 | S | 7/1998 | Gerba et al. |
| | | | | 5,787,249 | A | 7/1998 | Badovinatz et al. |
| | | | | 5,790,543 | A | 8/1998 | Cloutier |
| | | | | D397,996 | S | 9/1998 | Smith |
| | | | | 5,808,662 | A | 9/1998 | Kinney et al. |
| | | | | 5,812,201 | A | 9/1998 | Yoo |
| | | | | 5,815,689 | A | 9/1998 | Shaw et al. |
| | | | | 5,818,948 | A | 10/1998 | Gulick |
| | | | | D401,587 | S | 11/1998 | Rudolph |
| | | | | 5,832,024 | A | 11/1998 | Schotz et al. |
| | | | | 5,848,152 | A | 12/1998 | Slipy et al. |
| | | | | 5,852,722 | A | 12/1998 | Hamilton |
| | | | | D404,741 | S | 1/1999 | Schumaker et al. |
| | | | | D405,071 | S | 2/1999 | Gambaro |
| | | | | 5,867,691 | A | 2/1999 | Shiraishi |
| | | | | 5,875,233 | A | 2/1999 | Cox |
| | | | | 5,875,354 | A | 2/1999 | Charlton et al. |
| | | | | D406,847 | S | 3/1999 | Gerba et al. |

US 10,469,966 B2

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(56)

References Cited

U.S. PATENT DOCUMENTS

| | | | | | |
|--------------|---------|------------------|--------------|---------|----------------------|
| D407,071 S | 3/1999 | Keating | 6,430,353 B1 | 8/2002 | Honda et al. |
| 5,887,143 A | 3/1999 | Saito et al. | 6,442,443 B1 | 8/2002 | Fujii et al. |
| 5,905,768 A | 5/1999 | Maturi et al. | D462,339 S | 9/2002 | Allen et al. |
| D410,927 S | 6/1999 | Yamagishi | D462,340 S | 9/2002 | Allen et al. |
| 5,910,991 A | 6/1999 | Farrar | D462,945 S | 9/2002 | Skulley |
| D412,337 S | 7/1999 | Hamano | 6,449,642 B2 | 9/2002 | Bourke-Dunphy et al. |
| 5,923,869 A | 7/1999 | Kashiwagi et al. | 6,449,653 B2 | 9/2002 | Klemets et al. |
| 5,923,902 A | 7/1999 | Inagaki | 6,456,783 B1 | 9/2002 | Ando et al. |
| 5,946,343 A | 8/1999 | Schotz et al. | 6,463,474 B1 | 10/2002 | Fuh et al. |
| 5,956,025 A | 9/1999 | Goulden et al. | 6,466,832 B1 | 10/2002 | Zuqert et al. |
| 5,956,088 A | 9/1999 | Shen et al. | 6,469,633 B1 | 10/2002 | Wachter et al. |
| 5,960,006 A | 9/1999 | Maturi et al. | D466,108 S | 11/2002 | Glodava et al. |
| D415,496 S | 10/1999 | Gerba et al. | 6,487,296 B1 | 11/2002 | Allen et al. |
| D416,021 S | 11/1999 | Godette et al. | 6,493,832 B1 | 12/2002 | Itakura et al. |
| 5,984,512 A | 11/1999 | Jones et al. | D468,297 S | 1/2003 | Ikeda |
| 5,987,611 A | 11/1999 | Freund | 6,522,886 B1 | 2/2003 | Youngs et al. |
| 5,990,884 A | 11/1999 | Douma et al. | 6,526,325 B1 | 2/2003 | Sussman et al. |
| 5,991,307 A | 11/1999 | Komuro et al. | 6,535,121 B2 | 3/2003 | Matheny et al. |
| 5,999,906 A | 12/1999 | Merces et al. | D474,763 S | 5/2003 | Tozaki et al. |
| 6,009,457 A | 12/1999 | Moller | D475,993 S | 6/2003 | Meyer |
| 6,018,376 A | 1/2000 | Nakatani | D476,643 S | 7/2003 | Yamagishi |
| D420,006 S | 2/2000 | Tonino | D477,310 S | 7/2003 | Moransais |
| 6,026,150 A | 2/2000 | Frank et al. | 6,587,127 B1 | 7/2003 | Leeke et al. |
| 6,029,196 A | 2/2000 | Lenz | 6,598,172 B1 | 7/2003 | Vandeusen et al. |
| 6,031,818 A | 2/2000 | Lo et al. | D478,051 S | 8/2003 | Sagawa |
| 6,032,202 A | 2/2000 | Lea et al. | D478,069 S | 8/2003 | Beck et al. |
| 6,038,614 A | 3/2000 | Chan et al. | D478,896 S | 8/2003 | Summers |
| 6,046,550 A | 4/2000 | Ference et al. | 6,604,023 B1 | 8/2003 | Brown et al. |
| 6,061,457 A | 5/2000 | Stockhamer | 6,611,537 B1 | 8/2003 | Edens et al. |
| 6,078,725 A | 6/2000 | Tanaka | D479,520 S | 9/2003 | De |
| 6,081,266 A | 6/2000 | Sciammarella | D481,056 S | 10/2003 | Kawasaki et al. |
| 6,088,063 A | 7/2000 | Shiba | 6,631,410 B1 | 10/2003 | Kowalski et al. |
| D429,246 S | 8/2000 | Holma | 6,636,269 B1 | 10/2003 | Baldwin |
| D430,143 S | 8/2000 | Renk | 6,653,899 B2 | 11/2003 | Organvidez et al. |
| 6,101,195 A | 8/2000 | Lyons et al. | 6,654,720 B1 | 11/2003 | Graham et al. |
| 6,108,485 A | 8/2000 | Kim | 6,654,956 B1 | 11/2003 | Trinh et al. |
| 6,108,686 A | 8/2000 | Williams, Jr. | 6,658,091 B1 | 12/2003 | Naidoo et al. |
| 6,122,668 A | 9/2000 | Teng et al. | 6,674,803 B1 | 1/2004 | Kesselring |
| D431,552 S | 10/2000 | Backs et al. | 6,684,060 B1 | 1/2004 | Curtin |
| D432,525 S | 10/2000 | Beecroft | D486,145 S | 2/2004 | Kaminski et al. |
| 6,127,941 A | 10/2000 | Van Ryzin | 6,687,664 B1 | 2/2004 | Sussman et al. |
| 6,128,318 A | 10/2000 | Sato | 6,704,421 B1 | 3/2004 | Kitamura |
| 6,148,205 A | 11/2000 | Cotton | 6,741,961 B2 | 5/2004 | Lim |
| 6,157,957 A | 12/2000 | Berthaud | D491,925 S | 6/2004 | Griesau et al. |
| 6,163,647 A | 12/2000 | Terashima et al. | 6,757,517 B2 | 6/2004 | Chang et al. |
| 6,169,725 B1 | 1/2001 | Gibbs et al. | D493,148 S | 7/2004 | Shibata et al. |
| 6,175,872 B1 | 1/2001 | Neumann et al. | 6,763,274 B1 | 7/2004 | Gilbert |
| 6,181,383 B1 | 1/2001 | Fox et al. | D495,333 S | 8/2004 | Borsboom |
| 6,185,737 B1 | 2/2001 | Northcutt et al. | 6,778,073 B2 | 8/2004 | Lutter et al. |
| 6,195,435 B1 | 2/2001 | Kitamura | 6,778,493 B1 | 8/2004 | Ishii |
| 6,195,436 B1 | 2/2001 | Scibora et al. | 6,778,869 B2 | 8/2004 | Champion |
| 6,199,169 B1 | 3/2001 | Voth | D496,003 S | 9/2004 | Spira |
| 6,212,282 B1 | 4/2001 | Mershon | D496,005 S | 9/2004 | Wang |
| 6,246,701 B1 | 6/2001 | Slattery | D496,335 S | 9/2004 | Spira |
| 6,253,293 B1 | 6/2001 | Rao et al. | D497,363 S | 10/2004 | Olson et al. |
| D444,475 S | 7/2001 | Levey et al. | 6,803,964 B1 | 10/2004 | Post et al. |
| 6,255,961 B1 | 7/2001 | Van et al. | 6,809,635 B1 | 10/2004 | Kaaresoja |
| 6,256,554 B1 | 7/2001 | Dilorenzo | D499,086 S | 11/2004 | Polito |
| 6,269,406 B1 | 7/2001 | Dutcher et al. | 6,816,510 B1 | 11/2004 | Banerjee |
| 6,301,012 B1 | 10/2001 | White et al. | 6,816,818 B2 | 11/2004 | Wolf et al. |
| 6,308,207 B1 | 10/2001 | Tseng et al. | 6,823,225 B1 | 11/2004 | Sass |
| 6,310,652 B1 | 10/2001 | Li et al. | 6,826,283 B1 | 11/2004 | Wheeler et al. |
| 6,313,879 B1 | 11/2001 | Kubo et al. | D499,395 S | 12/2004 | Hsu |
| 6,321,252 B1 | 11/2001 | Bhola et al. | D499,718 S | 12/2004 | Chen |
| 6,324,586 B1 | 11/2001 | Johnson | D500,015 S | 12/2004 | Gubbe |
| D452,520 S | 12/2001 | Gotham et al. | 6,836,788 B2 | 12/2004 | Kim et al. |
| 6,332,147 B1 | 12/2001 | Moran et al. | 6,839,752 B1 | 1/2005 | Miller et al. |
| 6,343,028 B1 | 1/2002 | Kuwaoka | D501,477 S | 2/2005 | Hall |
| 6,349,285 B1 | 2/2002 | Liu et al. | 6,859,460 B1 | 2/2005 | Chen |
| 6,349,339 B1 | 2/2002 | Williams | 6,859,538 B1 | 2/2005 | Voltz |
| 6,351,821 B1 | 2/2002 | Voth | 6,873,862 B2 | 3/2005 | Reshefsky |
| 6,353,172 B1 | 3/2002 | Fay et al. | 6,882,335 B2 | 4/2005 | Saarin |
| 6,356,871 B1 | 3/2002 | Hemkumar et al. | D504,872 S | 5/2005 | Uehara et al. |
| 6,404,811 B1 | 6/2002 | Cvetko et al. | D504,885 S | 5/2005 | Zhang et al. |
| 6,418,150 B1 | 7/2002 | Staats | 6,889,207 B2 | 5/2005 | Slemmer et al. |
| | | | 6,898,642 B2 | 5/2005 | Chafle et al. |
| | | | 6,901,439 B1 | 5/2005 | Bonasia et al. |
| | | | D506,463 S | 6/2005 | Daniels |
| | | | 6,907,458 B2 | 6/2005 | Tomassetti et al. |

US 10,469,966 B2

Page 4

(56)

References Cited

U.S. PATENT DOCUMENTS

| | | | | | |
|--------------|---------|--------------------|--------------|---------|---------------------|
| 6,912,610 B2 | 6/2005 | Spencer | 7,333,519 B2 | 2/2008 | Sullivan et al. |
| 6,915,347 B2 | 7/2005 | Hanko et al. | 7,346,332 B2 | 3/2008 | McCarty et al. |
| 6,916,980 B2 | 7/2005 | Ishida et al. | 7,356,011 B1 | 4/2008 | Waters et al. |
| 6,917,592 B1 | 7/2005 | Ramankutty et al. | 7,359,006 B1 | 4/2008 | Xiang et al. |
| 6,919,771 B2 | 7/2005 | Nakajima | 7,366,206 B2 | 4/2008 | Lockridge et al. |
| 6,920,373 B2 | 7/2005 | Xi et al. | 7,372,846 B2 | 5/2008 | Zwack |
| 6,931,134 B1 | 8/2005 | Waller, Jr. et al. | 7,391,791 B2 | 6/2008 | Balassanian et al. |
| 6,931,557 B2 | 8/2005 | Togawa | 7,392,102 B2 | 6/2008 | Sullivan et al. |
| 6,934,766 B1 | 8/2005 | Russell | 7,392,481 B2 | 6/2008 | Gewickey et al. |
| 6,937,988 B1 | 8/2005 | Hemkumar et al. | 7,400,644 B2 | 7/2008 | Sakamoto et al. |
| 6,970,482 B2 | 11/2005 | Kim | 7,412,499 B2 | 8/2008 | Chang et al. |
| 6,985,694 B1 | 1/2006 | De Bonet et al. | 7,424,267 B2 | 9/2008 | Eisenbach |
| 6,987,767 B2 | 1/2006 | Saito | 7,428,310 B2 | 9/2008 | Park |
| 6,987,947 B2 | 1/2006 | Richenstein et al. | 7,430,181 B1 | 9/2008 | Hong |
| D515,072 S | 2/2006 | Lee | 7,457,948 B1 | 11/2008 | Bilicksa et al. |
| D515,557 S | 2/2006 | Okuley | 7,472,058 B2 | 12/2008 | Tseng et al. |
| 7,007,106 B1 | 2/2006 | Flood et al. | 7,474,677 B2 | 1/2009 | Trott |
| 7,020,791 B1 | 3/2006 | Aweya et al. | 7,483,538 B2 | 1/2009 | McCarty et al. |
| D518,475 S | 4/2006 | Yang et al. | 7,483,540 B2 | 1/2009 | Rabinowitz et al. |
| 7,043,477 B2 | 5/2006 | Mercer et al. | 7,483,958 B1 | 1/2009 | Elabbady et al. |
| 7,043,651 B2 | 5/2006 | Aweya et al. | 7,490,044 B2 | 2/2009 | Kulkarni |
| 7,046,677 B2 | 5/2006 | Monta et al. | 7,492,912 B2 | 2/2009 | Chung et al. |
| 7,047,308 B2 | 5/2006 | Deshpande | 7,505,889 B2 | 3/2009 | Salmonsens et al. |
| 7,054,888 B2 | 5/2006 | Lachapelle et al. | 7,509,181 B2 | 3/2009 | Champion |
| 7,058,889 B2 | 6/2006 | Trovato et al. | 7,519,188 B2 | 4/2009 | Berardi et al. |
| 7,068,596 B1 | 6/2006 | Mou | 7,519,667 B1 | 4/2009 | Capps |
| D524,296 S | 7/2006 | Kita | 7,539,551 B2 | 5/2009 | Komura et al. |
| 7,072,477 B1 | 7/2006 | Kincaid | 7,548,744 B2 | 6/2009 | Oesterling et al. |
| D527,375 S | 8/2006 | Flora et al. | 7,548,851 B1 | 6/2009 | Lau et al. |
| 7,092,528 B2 | 8/2006 | Patrick et al. | 7,558,224 B1 | 7/2009 | Surazski et al. |
| 7,092,694 B2 | 8/2006 | Griep et al. | 7,558,635 B1 | 7/2009 | Thiel et al. |
| 7,096,169 B2 | 8/2006 | Crutchfield et al. | 7,561,932 B1 | 7/2009 | Holmes et al. |
| 7,113,999 B2 | 9/2006 | Pestoni et al. | 7,571,014 B1 | 8/2009 | Lambourne et al. |
| 7,115,017 B1 | 10/2006 | Laursen et al. | 7,574,274 B2 | 8/2009 | Holmes |
| 7,120,168 B2 | 10/2006 | Zimmermann | 7,599,685 B2 | 10/2009 | Goldberg et al. |
| 7,130,316 B2 | 10/2006 | Kovacevic | 7,606,174 B2 | 10/2009 | Ochi et al. |
| 7,130,368 B1 | 10/2006 | Aweya et al. | 7,620,468 B2 | 11/2009 | Shimizu |
| 7,130,608 B2 | 10/2006 | Hollstrom et al. | 7,626,952 B2 | 12/2009 | Slemmer et al. |
| 7,130,616 B2 | 10/2006 | Janik | 7,627,825 B2 | 12/2009 | Kakuda |
| 7,136,934 B2 | 11/2006 | Carter et al. | 7,630,500 B1 | 12/2009 | Beckman et al. |
| 7,139,981 B2 | 11/2006 | Mayer et al. | 7,630,501 B2 | 12/2009 | Blank et al. |
| 7,143,141 B1 | 11/2006 | Morgan et al. | 7,631,119 B2 | 12/2009 | Moore et al. |
| 7,143,939 B2 | 12/2006 | Henzerling | 7,643,894 B2 | 1/2010 | Braithwaite et al. |
| 7,146,260 B2 | 12/2006 | Preston et al. | 7,653,344 B1 | 1/2010 | Feldman et al. |
| 7,158,488 B2 | 1/2007 | Fujimori | 7,657,224 B2 | 2/2010 | Goldberg et al. |
| 7,161,939 B2 | 1/2007 | Israel et al. | 7,657,644 B1 | 2/2010 | Zheng |
| 7,162,315 B2 | 1/2007 | Gilbert | 7,657,910 B1 | 2/2010 | McAulay et al. |
| 7,171,010 B2 | 1/2007 | Martin et al. | 7,665,115 B2 | 2/2010 | Gallo et al. |
| 7,185,090 B2 | 2/2007 | Kowalski et al. | 7,668,990 B2 | 2/2010 | Krzyzanowski et al. |
| 7,187,947 B1 | 3/2007 | White et al. | 7,669,113 B1 | 2/2010 | Moore et al. |
| 7,197,148 B2 | 3/2007 | Nourse et al. | 7,669,219 B2 | 2/2010 | Scott, III |
| 7,206,367 B1 | 4/2007 | Moore et al. | 7,672,470 B2 | 3/2010 | Lee |
| 7,206,618 B2 | 4/2007 | Latto et al. | 7,675,943 B2 | 3/2010 | Mosig et al. |
| 7,206,967 B1 | 4/2007 | Marti et al. | 7,676,044 B2 | 3/2010 | Sasaki et al. |
| 7,209,795 B2 | 4/2007 | Sullivan et al. | 7,676,142 B1 | 3/2010 | Hung |
| 7,218,708 B2 | 5/2007 | Berezowski | 7,688,306 B2 | 3/2010 | Wehrenberg et al. |
| 7,236,739 B2 | 6/2007 | Chang et al. | 7,689,304 B2 | 3/2010 | Sasaki |
| 7,236,773 B2 | 6/2007 | Thomas | 7,689,305 B2 | 3/2010 | Kreifeldt et al. |
| 7,257,398 B1 | 8/2007 | Ukita et al. | 7,702,279 B2 | 4/2010 | Ko et al. |
| 7,260,616 B1 | 8/2007 | Cook | 7,702,403 B1 | 4/2010 | Gladwin et al. |
| 7,263,110 B2 | 8/2007 | Fujihiro | 7,710,941 B2 | 5/2010 | Rietschel et al. |
| 7,277,547 B1 | 10/2007 | Delker et al. | 7,711,774 B1 | 5/2010 | Rothschild |
| 7,286,652 B1 | 10/2007 | Azriel et al. | 7,720,096 B2 | 5/2010 | Klemets |
| 7,289,631 B2 | 10/2007 | Ishidoshiro | 7,721,032 B2 | 5/2010 | Bushell et al. |
| 7,293,060 B2 | 11/2007 | Komsu | 7,742,740 B2 | 6/2010 | Goldberg et al. |
| 7,295,548 B2 | 11/2007 | Blank et al. | 7,742,832 B1 | 6/2010 | Feldman et al. |
| 7,302,468 B2 | 11/2007 | Wijeratne | 7,743,009 B2 | 6/2010 | Hangartner et al. |
| 7,305,694 B2 | 12/2007 | Commons et al. | 7,746,906 B2 | 6/2010 | Jinzaki et al. |
| 7,308,188 B2 | 12/2007 | Namatame | 7,761,176 B2 | 7/2010 | Ben-Yaacov et al. |
| 7,310,334 B1 | 12/2007 | Fitzgerald et al. | 7,765,315 B2 | 7/2010 | Batson et al. |
| 7,312,785 B2 | 12/2007 | Tsuk et al. | RE41,608 E | 8/2010 | Blair et al. |
| 7,313,593 B1 | 12/2007 | Pulito et al. | 7,792,311 B1 | 9/2010 | Holmgren et al. |
| 7,319,764 B1 | 1/2008 | Reid et al. | 7,793,206 B2 | 9/2010 | Lim et al. |
| 7,324,857 B2 | 1/2008 | Goddard | 7,804,972 B2 | 9/2010 | Melanson |
| 7,330,875 B1 | 2/2008 | Parasnis et al. | 7,805,210 B2 | 9/2010 | Cucos et al. |
| | | | 7,817,960 B2 | 10/2010 | Tan et al. |
| | | | 7,827,259 B2 | 11/2010 | Heller et al. |
| | | | 7,831,054 B2 | 11/2010 | Ball et al. |
| | | | 7,835,689 B2 | 11/2010 | Goldberg et al. |

US 10,469,966 B2

Page 5

(56)

References Cited

U.S. PATENT DOCUMENTS

| | | | | | |
|--------------|---------|--------------------|--------------|---------|----------------------|
| 7,849,181 B2 | 12/2010 | Slemmer et al. | 8,265,310 B2 | 9/2012 | Berardi et al. |
| 7,853,341 B2 | 12/2010 | McCarty et al. | 8,279,709 B2 | 10/2012 | Choisel et al. |
| 7,865,137 B2 | 1/2011 | Goldberg et al. | 8,281,001 B2 | 10/2012 | Busam et al. |
| 7,882,234 B2 | 2/2011 | Watanabe et al. | 8,285,404 B1 | 10/2012 | Kekki |
| 7,885,622 B2 | 2/2011 | Krampf et al. | 8,290,185 B2 | 10/2012 | Kim |
| 7,907,819 B2 | 3/2011 | Ando et al. | 8,290,603 B1 | 10/2012 | Lambourne et al. |
| 7,916,877 B2 | 3/2011 | Goldberg et al. | 8,300,845 B2 | 10/2012 | Zurek et al. |
| 7,917,082 B2 | 3/2011 | Goldberg et al. | 8,306,235 B2 | 11/2012 | Mahowald |
| 7,933,418 B2 | 4/2011 | Morishima | 8,311,226 B2 | 11/2012 | Lorgeoux et al. |
| 7,934,239 B1 | 4/2011 | Dagman | 8,315,555 B2 | 11/2012 | Ko et al. |
| 7,945,636 B2 | 5/2011 | Nelson et al. | 8,316,147 B2 | 11/2012 | Batson et al. |
| 7,945,708 B2 | 5/2011 | Ohkita | 8,325,931 B2 | 12/2012 | Howard et al. |
| 7,958,441 B2 | 6/2011 | Heller et al. | 8,325,935 B2 | 12/2012 | Rutschman |
| 7,962,482 B2 | 6/2011 | Handman et al. | 8,331,585 B2 | 12/2012 | Hagen et al. |
| 7,966,388 B1 | 6/2011 | Pugaczewski et al. | 8,340,330 B2 | 12/2012 | Yoon et al. |
| 7,987,294 B2 | 7/2011 | Bryce et al. | 8,345,709 B2 | 1/2013 | Nitzpon et al. |
| 7,995,732 B2 | 8/2011 | Koch et al. | 8,364,295 B2 | 1/2013 | Beckmann et al. |
| 7,996,566 B1 | 8/2011 | Sylvain et al. | 8,370,678 B2 | 2/2013 | Millington et al. |
| 7,996,588 B2 | 8/2011 | Subbiah et al. | 8,374,595 B2 | 2/2013 | Chien et al. |
| 8,014,423 B2 | 9/2011 | Thaler et al. | 8,391,501 B2 | 3/2013 | Khawand et al. |
| 8,015,306 B2 | 9/2011 | Bowman | 8,407,623 B2 | 3/2013 | Kerr et al. |
| 8,020,023 B2 | 9/2011 | Millington et al. | 8,411,883 B2 | 4/2013 | Matsumoto |
| 8,023,663 B2 | 9/2011 | Goldberg | 8,423,659 B2 | 4/2013 | Millington |
| 8,028,038 B2 | 9/2011 | Weel | 8,423,893 B2 | 4/2013 | Ramsay et al. |
| 8,028,323 B2 | 9/2011 | Weel | 8,432,851 B2 | 4/2013 | Xu et al. |
| 8,041,062 B2 | 10/2011 | Cohen et al. | 8,433,076 B2 | 4/2013 | Zurek et al. |
| 8,045,721 B2 | 10/2011 | Burgan et al. | 8,442,239 B2 | 5/2013 | Bruelle-Drews et al. |
| 8,045,952 B2 | 10/2011 | Qureshey et al. | 8,452,020 B2 | 5/2013 | Gregg et al. |
| 8,050,203 B2 | 11/2011 | Jacobsen et al. | 8,457,334 B2 | 6/2013 | Yoon et al. |
| 8,050,652 B2 | 11/2011 | Qureshey et al. | 8,463,184 B2 | 6/2013 | Dua |
| 8,054,987 B2 | 11/2011 | Seydoux | 8,463,875 B2 | 6/2013 | Katz et al. |
| 8,055,364 B2 | 11/2011 | Champion | 8,473,844 B2 | 6/2013 | Kreifeldt et al. |
| 8,063,698 B2 | 11/2011 | Howard | 8,477,958 B2 | 7/2013 | Moeller et al. |
| 8,074,253 B1 | 12/2011 | Nathan | 8,483,853 B1 | 7/2013 | Lambourne et al. |
| 8,086,287 B2 | 12/2011 | Mooney et al. | 8,498,726 B2 | 7/2013 | Kim et al. |
| 8,086,752 B2 | 12/2011 | Millington et al. | 8,509,211 B2 | 8/2013 | Trotter et al. |
| 8,090,317 B2 | 1/2012 | Burge et al. | 8,520,870 B2 | 8/2013 | Sato et al. |
| 8,103,009 B2 | 1/2012 | McCarty et al. | 8,565,455 B2 | 10/2013 | Worrell et al. |
| 8,111,132 B2 | 2/2012 | Allen et al. | 8,577,045 B2 | 11/2013 | Gibbs |
| 8,112,032 B2 | 2/2012 | Ko et al. | 8,577,048 B2 | 11/2013 | Chaikin et al. |
| 8,116,476 B2 | 2/2012 | Inohara | 8,588,432 B1 | 11/2013 | Simon |
| 8,126,172 B2 | 2/2012 | Horbach et al. | 8,588,949 B2 | 11/2013 | Lambourne et al. |
| 8,131,389 B1 | 3/2012 | Hardwick et al. | 8,600,075 B2 | 12/2013 | Lim |
| 8,131,390 B2 | 3/2012 | Braithwaite et al. | 8,600,084 B1 | 12/2013 | Garrett |
| 8,135,141 B2 | 3/2012 | Shiba | 8,611,559 B2 | 12/2013 | Sanders |
| 8,139,774 B2 | 3/2012 | Berardi et al. | 8,615,091 B2 | 12/2013 | Terwal |
| 8,144,883 B2 | 3/2012 | Pdersen et al. | 8,620,006 B2 | 12/2013 | Berardi et al. |
| 8,148,622 B2 | 4/2012 | Rothkopf et al. | 8,639,830 B2 | 1/2014 | Bowman |
| 8,150,079 B2 | 4/2012 | Maeda et al. | 8,654,995 B2 | 2/2014 | Silber et al. |
| 8,160,281 B2 | 4/2012 | Kim et al. | 8,672,744 B1 | 3/2014 | Gronkowski et al. |
| 8,169,938 B2 | 5/2012 | Duchscher et al. | 8,683,009 B2 | 3/2014 | Ng et al. |
| 8,170,222 B2 | 5/2012 | Dunko | 8,700,730 B2 | 4/2014 | Rowe |
| 8,170,260 B2 | 5/2012 | Reining et al. | 8,731,206 B1 | 5/2014 | Park |
| 8,175,292 B2 | 5/2012 | Aylward et al. | 8,750,282 B2 | 6/2014 | Gelter et al. |
| 8,175,297 B1 | 5/2012 | Ho et al. | 8,751,026 B2 | 6/2014 | Sato et al. |
| 8,185,674 B2 | 5/2012 | Moore et al. | 8,762,565 B2 | 6/2014 | Togashi et al. |
| 8,189,824 B2 | 5/2012 | Strauss et al. | 8,775,546 B2 | 7/2014 | Millington |
| 8,194,874 B2 | 6/2012 | Starobin et al. | 8,788,080 B1 | 7/2014 | Kallai et al. |
| 8,204,890 B1 | 6/2012 | Gogan et al. | 8,818,538 B2 | 8/2014 | Sakata |
| 8,208,653 B2 | 6/2012 | Eo et al. | 8,819,554 B2 | 8/2014 | Basso et al. |
| 8,214,447 B2 | 7/2012 | Deslippe et al. | 8,843,224 B2 | 9/2014 | Holmgren et al. |
| 8,214,740 B2 | 7/2012 | Johnson | 8,843,228 B2 | 9/2014 | Lambourne |
| 8,214,873 B2 | 7/2012 | Weel | 8,843,586 B2 | 9/2014 | Pantos et al. |
| 8,218,790 B2 | 7/2012 | Bull et al. | 8,855,319 B2 | 10/2014 | Liu et al. |
| 8,229,125 B2 | 7/2012 | Short | 8,861,739 B2 | 10/2014 | Ojanpera |
| 8,230,099 B2 | 7/2012 | Weel | 8,879,761 B2 | 11/2014 | Johnson et al. |
| 8,233,029 B2 | 7/2012 | Yoshida et al. | 8,885,851 B2 | 11/2014 | Westenbroek |
| 8,233,632 B1 | 7/2012 | MacDonald et al. | 8,886,347 B2 | 11/2014 | Lambourne |
| 8,233,635 B2 | 7/2012 | Shiba | 8,904,066 B2 | 12/2014 | Moore et al. |
| 8,233,648 B2 | 7/2012 | Sorek et al. | 8,914,559 B2 | 12/2014 | Kalayjian et al. |
| 8,234,395 B2 | 7/2012 | Millington et al. | 8,917,877 B2 | 12/2014 | Haaff et al. |
| 8,238,578 B2 | 8/2012 | Aylward | 8,923,997 B2 | 12/2014 | Kallai et al. |
| 8,239,559 B2 | 8/2012 | Rajapakse | 8,930,006 B2 | 1/2015 | Haatainen |
| 8,239,748 B1 | 8/2012 | Moore et al. | 8,934,647 B2 | 1/2015 | Joyce et al. |
| 8,243,961 B1 | 8/2012 | Morrill | 8,934,655 B2 | 1/2015 | Breen et al. |
| | | | 8,942,252 B2 | 1/2015 | Balassanian et al. |
| | | | 8,942,395 B2 | 1/2015 | Lissaman et al. |
| | | | 8,954,177 B2 | 2/2015 | Sanders |
| | | | 8,965,544 B2 | 2/2015 | Ramsay |

US 10,469,966 B2

Page 6

(56)

References Cited

U.S. PATENT DOCUMENTS

| | | | | | |
|-----------------|---------|-------------------------|-----------------|---------|-----------------------|
| 8,965,546 B2 | 2/2015 | Visser et al. | 2003/0002689 A1 | 1/2003 | Folio |
| 8,966,394 B2 | 2/2015 | Gates et al. | 2003/0008616 A1 | 1/2003 | Anderson |
| 8,977,974 B2 | 3/2015 | Kraut | 2003/0014486 A1 | 1/2003 | May |
| 8,984,442 B2 | 3/2015 | Pirnack et al. | 2003/0018797 A1 | 1/2003 | Dunning et al. |
| 9,020,153 B2 | 4/2015 | Britt, Jr. | 2003/0020763 A1 | 1/2003 | Mayer et al. |
| 9,042,556 B2 | 5/2015 | Kallai et al. | 2003/0023741 A1 | 1/2003 | Tomassetti et al. |
| 9,112,622 B2 | 8/2015 | Miyata et al. | 2003/0031333 A1 | 2/2003 | Cohen et al. |
| 9,137,602 B2 | 9/2015 | Mayman et al. | 2003/0035072 A1 | 2/2003 | Hagg |
| 9,160,965 B2 | 10/2015 | Redmann et al. | 2003/0035444 A1 | 2/2003 | Zwack |
| 9,195,258 B2 | 11/2015 | Millington | 2003/0041173 A1 | 2/2003 | Hoyle |
| 9,219,959 B2 | 12/2015 | Kallai et al. | 2003/0041174 A1 | 2/2003 | Wen et al. |
| 9,226,073 B2 | 12/2015 | Ramos et al. | 2003/0043856 A1 | 3/2003 | Lakaniemi et al. |
| 9,245,514 B2 | 1/2016 | Donaldson | 2003/0043924 A1 | 3/2003 | Haddad et al. |
| 9,325,286 B1 | 4/2016 | Yang | 2003/0055892 A1 | 3/2003 | Huitema et al. |
| 9,524,098 B2 | 12/2016 | Griffiths et al. | 2003/0061428 A1 | 3/2003 | Garney et al. |
| 2001/0001160 A1 | 5/2001 | Shoff et al. | 2003/0063755 A1 | 4/2003 | Nourse et al. |
| 2001/0009604 A1 | 7/2001 | Ando et al. | 2003/0066094 A1 | 4/2003 | Van Der Schaar et al. |
| 2001/0022823 A1 | 9/2001 | Renaud | 2003/0067437 A1 | 4/2003 | McClintock et al. |
| 2001/0027498 A1 | 10/2001 | Van De Meulenhof et al. | 2003/0073432 A1 | 4/2003 | Meade |
| 2001/0032188 A1 | 10/2001 | Miyabe et al. | 2003/0091322 A1 | 5/2003 | Van |
| 2001/0042107 A1 | 11/2001 | Palm | 2003/0097478 A1 | 5/2003 | King |
| 2001/0043456 A1 | 11/2001 | Atkinson | 2003/0099212 A1 | 5/2003 | Anjum et al. |
| 2001/0046235 A1 | 11/2001 | Trevitt et al. | 2003/0099221 A1 | 5/2003 | Rhee |
| 2001/0047377 A1 | 11/2001 | Sincaglia et al. | 2003/0101253 A1 | 5/2003 | Saito et al. |
| 2001/0050991 A1 | 12/2001 | Eves | 2003/0103088 A1 | 6/2003 | Dresti et al. |
| 2002/0002039 A1 | 1/2002 | Qureshey et al. | 2003/0110329 A1 | 6/2003 | Higaki et al. |
| 2002/0002562 A1 | 1/2002 | Moran et al. | 2003/0126211 A1 | 7/2003 | Anttila et al. |
| 2002/0002565 A1 | 1/2002 | Ohyama | 2003/0135822 A1 | 7/2003 | Evans |
| 2002/0003548 A1 | 1/2002 | Krusche et al. | 2003/0157951 A1 | 8/2003 | Hasty |
| 2002/0022453 A1 | 2/2002 | Balog et al. | 2003/0161479 A1 | 8/2003 | Yang et al. |
| 2002/0026442 A1 | 2/2002 | Lipscomb et al. | 2003/0167335 A1 | 9/2003 | Alexander |
| 2002/0034374 A1 | 3/2002 | Barton | 2003/0172123 A1 | 9/2003 | Polan et al. |
| 2002/0042844 A1 | 4/2002 | Chiazzeze | 2003/0177889 A1 | 9/2003 | Koseki et al. |
| 2002/0049843 A1 | 4/2002 | Barone et al. | 2003/0179780 A1 | 9/2003 | Walker et al. |
| 2002/0062406 A1 | 5/2002 | Chang et al. | 2003/0185400 A1 | 10/2003 | Yoshizawa et al. |
| 2002/0065926 A1 | 5/2002 | Hackney et al. | 2003/0195964 A1 | 10/2003 | Mane |
| 2002/0067909 A1 | 6/2002 | Iivonen | 2003/0198254 A1 | 10/2003 | Sullivan et al. |
| 2002/0072816 A1 | 6/2002 | Shdema et al. | 2003/0198255 A1 | 10/2003 | Sullivan et al. |
| 2002/0072817 A1 | 6/2002 | Champion | 2003/0198257 A1 | 10/2003 | Sullivan et al. |
| 2002/0073228 A1 | 6/2002 | Cognet et al. | 2003/0200001 A1 | 10/2003 | Goddard et al. |
| 2002/0078161 A1 | 6/2002 | Cheng | 2003/0204273 A1 | 10/2003 | Dinker et al. |
| 2002/0078293 A1 | 6/2002 | Kou et al. | 2003/0204509 A1 | 10/2003 | Dinker et al. |
| 2002/0080783 A1 | 6/2002 | Fujimori et al. | 2003/0210796 A1 | 11/2003 | McCarty et al. |
| 2002/0090914 A1 | 7/2002 | Kang et al. | 2003/0212802 A1 | 11/2003 | Rector et al. |
| 2002/0093478 A1 | 7/2002 | Yeh | 2003/0219007 A1 | 11/2003 | Barrack et al. |
| 2002/0095460 A1 | 7/2002 | Benson | 2003/0227478 A1 | 12/2003 | Chatfield |
| 2002/0098878 A1 | 7/2002 | Mooney et al. | 2003/0229900 A1 | 12/2003 | Reisman |
| 2002/0101357 A1 | 8/2002 | Gharapetian | 2003/0231208 A1 | 12/2003 | Hanon et al. |
| 2002/0103635 A1 | 8/2002 | Mesarovic | 2003/0231871 A1 | 12/2003 | Ushimaru |
| 2002/0109710 A1 | 8/2002 | Holtz et al. | 2003/0235304 A1 | 12/2003 | Evans et al. |
| 2002/0112244 A1 | 8/2002 | Liou et al. | 2004/0001106 A1 | 1/2004 | Deutscher et al. |
| 2002/0114354 A1 | 8/2002 | Sinha et al. | 2004/0001484 A1 | 1/2004 | Ozguner |
| 2002/0114359 A1 | 8/2002 | Ibaraki et al. | 2004/0001591 A1 | 1/2004 | Mani et al. |
| 2002/0124097 A1 | 9/2002 | Isely et al. | 2004/0008852 A1 | 1/2004 | Also et al. |
| 2002/0129156 A1 | 9/2002 | Yoshikawa | 2004/0010727 A1 | 1/2004 | Fujinami |
| 2002/0131398 A1 | 9/2002 | Taylor | 2004/0012620 A1 | 1/2004 | Buhler et al. |
| 2002/0131761 A1 | 9/2002 | Kawasaki et al. | 2004/0014426 A1 | 1/2004 | Moore |
| 2002/0136335 A1 | 9/2002 | Liou et al. | 2004/0015252 A1 | 1/2004 | Aiso et al. |
| 2002/0137505 A1 | 9/2002 | Eiche et al. | 2004/0019497 A1 | 1/2004 | Volk et al. |
| 2002/0143547 A1 | 10/2002 | Fay et al. | 2004/0019807 A1 | 1/2004 | Freund et al. |
| 2002/0143998 A1 | 10/2002 | Rajagopal et al. | 2004/0019911 A1 | 1/2004 | Gates et al. |
| 2002/0150053 A1 | 10/2002 | Gray et al. | 2004/0023697 A1 | 2/2004 | Komura |
| 2002/0159596 A1 | 10/2002 | Durand et al. | 2004/0024478 A1 | 2/2004 | Hans et al. |
| 2002/0163361 A1 | 11/2002 | Parkin | 2004/0024925 A1 | 2/2004 | Cypher et al. |
| 2002/0165721 A1 | 11/2002 | Chang et al. | 2004/0027166 A1 | 2/2004 | Mangum et al. |
| 2002/0165921 A1 | 11/2002 | Sapieyevski | 2004/0032348 A1 | 2/2004 | Lai et al. |
| 2002/0168938 A1 | 11/2002 | Chang | 2004/0032421 A1 | 2/2004 | Williamson et al. |
| 2002/0173273 A1 | 11/2002 | Spurgat et al. | 2004/0037433 A1 | 2/2004 | Chen |
| 2002/0177411 A1 | 11/2002 | Yajima et al. | 2004/0041836 A1 | 3/2004 | Zaner et al. |
| 2002/0181355 A1 | 12/2002 | Shikunami et al. | 2004/0042629 A1 | 3/2004 | Mellone et al. |
| 2002/0184310 A1 | 12/2002 | Traversat et al. | 2004/0044742 A1 | 3/2004 | Evron et al. |
| 2002/0188762 A1 | 12/2002 | Tomassetti et al. | 2004/0048569 A1 | 3/2004 | Kawamura |
| 2002/0194309 A1 | 12/2002 | Carter et al. | 2004/0059842 A1 | 3/2004 | Hanson et al. |
| 2002/0196951 A1 | 12/2002 | Tsai | 2004/0059965 A1 | 3/2004 | Marshall et al. |
| 2003/0002609 A1 | 1/2003 | Faller et al. | 2004/0066736 A1 | 4/2004 | Kroeger |
| | | | 2004/0071299 A1 | 4/2004 | Yoshino |
| | | | 2004/0075767 A1 | 4/2004 | Neuman et al. |
| | | | 2004/0078383 A1 | 4/2004 | Mercer et al. |
| | | | 2004/0080671 A1 | 4/2004 | Siemens et al. |

US 10,469,966 B2

Page 7

(56)

References Cited

U.S. PATENT DOCUMENTS

| | | | | | |
|-----------------|---------|---------------------|-----------------|---------|--------------------|
| 2004/0093096 A1 | 5/2004 | Huang et al. | 2005/0216556 A1 | 9/2005 | Manion et al. |
| 2004/0098754 A1 | 5/2004 | Vella et al. | 2005/0254505 A1 | 11/2005 | Chang et al. |
| 2004/0111473 A1 | 6/2004 | Lysenko et al. | 2005/0262217 A1 | 11/2005 | Nonaka et al. |
| 2004/0114771 A1 | 6/2004 | Vaughan et al. | 2005/0266798 A1 | 12/2005 | Moloney et al. |
| 2004/0117044 A1 | 6/2004 | Konetski | 2005/0266826 A1 | 12/2005 | Vlad |
| 2004/0117462 A1 | 6/2004 | Bodin et al. | 2005/0281255 A1 | 12/2005 | Davies et al. |
| 2004/0128701 A1 | 7/2004 | Kaneko et al. | 2005/0283820 A1 | 12/2005 | Richards et al. |
| 2004/0131192 A1 | 7/2004 | Metcalf | 2005/0288805 A1 | 12/2005 | Moore et al. |
| 2004/0133689 A1 | 7/2004 | Vasisht | 2005/0289224 A1 | 12/2005 | Deslippe et al. |
| 2004/0143368 A1 | 7/2004 | May et al. | 2005/0289244 A1 | 12/2005 | Sahu et al. |
| 2004/0143852 A1 | 7/2004 | Meyers | 2006/0041616 A1 | 2/2006 | Ludwig et al. |
| 2004/0147224 A1 | 7/2004 | Lee | 2006/0041639 A1 | 2/2006 | Lamkin et al. |
| 2004/0148237 A1 | 7/2004 | Bittmann et al. | 2006/0045281 A1 | 3/2006 | Korneluk et al. |
| 2004/0168081 A1 | 8/2004 | Ladas et al. | 2006/0072489 A1 | 4/2006 | Toyoshima |
| 2004/0170383 A1 | 9/2004 | Mazur | 2006/0095516 A1 | 5/2006 | Wijeratne |
| 2004/0171346 A1 | 9/2004 | Lin | 2006/0098936 A1 | 5/2006 | Ikeda et al. |
| 2004/0177167 A1 | 9/2004 | Iwamura et al. | 2006/0119497 A1 | 6/2006 | Miller et al. |
| 2004/0179554 A1 | 9/2004 | Tsao | 2006/0143236 A1 | 6/2006 | Wu |
| 2004/0183827 A1 | 9/2004 | Putterman et al. | 2006/0149402 A1 | 7/2006 | Chung |
| 2004/0185773 A1 | 9/2004 | Gerber et al. | 2006/0155721 A1 | 7/2006 | Grunwald et al. |
| 2004/0203354 A1 | 10/2004 | Yue | 2006/0173844 A1 | 8/2006 | Zhang et al. |
| 2004/0203378 A1 | 10/2004 | Powers | 2006/0179160 A1 | 8/2006 | Uehara et al. |
| 2004/0203590 A1 | 10/2004 | Shteyn | 2006/0193454 A1 | 8/2006 | Abou-Chakra et al. |
| 2004/0208158 A1 | 10/2004 | Fellman et al. | 2006/0193482 A1 | 8/2006 | Harvey et al. |
| 2004/0213230 A1 | 10/2004 | Douskalis et al. | 2006/0199538 A1 | 9/2006 | Eisenbach |
| 2004/0220687 A1 | 11/2004 | Klotz et al. | 2006/0205349 A1 | 9/2006 | Passier et al. |
| 2004/0223622 A1 | 11/2004 | Lindemann et al. | 2006/0222186 A1 | 10/2006 | Paige et al. |
| 2004/0224638 A1 | 11/2004 | Fadell et al. | 2006/0227985 A1 | 10/2006 | Kawanami |
| 2004/0225389 A1 | 11/2004 | Ledoux et al. | 2006/0229752 A1 | 10/2006 | Chung |
| 2004/0228367 A1 | 11/2004 | Mosig et al. | 2006/0259649 A1 | 11/2006 | Hsieh et al. |
| 2004/0248601 A1 | 12/2004 | Chang | 2006/0270395 A1 | 11/2006 | Dhawan et al. |
| 2004/0249490 A1 | 12/2004 | Sakai | 2006/0294569 A1 | 12/2006 | Chung |
| 2004/0249965 A1 | 12/2004 | Huggins et al. | 2007/0003067 A1 | 1/2007 | Gierl et al. |
| 2004/0249982 A1 | 12/2004 | Arnold et al. | 2007/0003075 A1 | 1/2007 | Cooper et al. |
| 2004/0252400 A1 | 12/2004 | Blank et al. | 2007/0022207 A1 | 1/2007 | Millington et al. |
| 2004/0253969 A1 | 12/2004 | Nguyen et al. | 2007/0038999 A1 | 2/2007 | Millington et al. |
| 2004/0264717 A1 | 12/2004 | Fujita et al. | 2007/0043847 A1 | 2/2007 | Carter et al. |
| 2005/0002535 A1 | 1/2005 | Liu et al. | 2007/0047712 A1 | 3/2007 | Gross et al. |
| 2005/0010691 A1 | 1/2005 | Oyadomari et al. | 2007/0048713 A1 | 3/2007 | Plastina et al. |
| 2005/0011388 A1 | 1/2005 | Kouznetsov | 2007/0054680 A1 | 3/2007 | Mo et al. |
| 2005/0013394 A1 | 1/2005 | Rausch et al. | 2007/0071255 A1 | 3/2007 | Schobben |
| 2005/0015551 A1 | 1/2005 | Eames et al. | 2007/0087686 A1 | 4/2007 | Holm et al. |
| 2005/0021470 A1 | 1/2005 | Martin et al. | 2007/0142022 A1 | 6/2007 | Madonna et al. |
| 2005/0021590 A1 | 1/2005 | Debique et al. | 2007/0142944 A1 | 6/2007 | Goldberg et al. |
| 2005/0027821 A1 | 2/2005 | Alexander et al. | 2007/0143493 A1 | 6/2007 | Mullig et al. |
| 2005/0031135 A1 | 2/2005 | Devantier et al. | 2007/0169115 A1 | 7/2007 | Ko et al. |
| 2005/0047605 A1 | 3/2005 | Lee et al. | 2007/0180137 A1 | 8/2007 | Rajapakse |
| 2005/0058149 A1 | 3/2005 | Howe | 2007/0189544 A1 | 8/2007 | Rosenberg |
| 2005/0060435 A1 | 3/2005 | Xue et al. | 2007/0192156 A1 | 8/2007 | Gauger |
| 2005/0062637 A1 | 3/2005 | El Zabadiani et al. | 2007/0206829 A1 | 9/2007 | Weinans et al. |
| 2005/0069153 A1 | 3/2005 | Hall et al. | 2007/0223725 A1 | 9/2007 | Neumann et al. |
| 2005/0081213 A1 | 4/2005 | Suzuoki et al. | 2007/0249295 A1 | 10/2007 | Ukita et al. |
| 2005/0100174 A1 | 5/2005 | Howard et al. | 2007/0265031 A1 | 11/2007 | Koizumi et al. |
| 2005/0105052 A1 | 5/2005 | McCormick et al. | 2007/0271388 A1 | 11/2007 | Bowra et al. |
| 2005/0114538 A1 | 5/2005 | Rose | 2007/0288610 A1 | 12/2007 | Saint et al. |
| 2005/0120128 A1 | 6/2005 | Willes et al. | 2007/0299778 A1 | 12/2007 | Haveson et al. |
| 2005/0125222 A1 | 6/2005 | Brown et al. | 2008/0002836 A1 | 1/2008 | Moeller et al. |
| 2005/0125357 A1 | 6/2005 | Saadat et al. | 2008/0007649 A1 | 1/2008 | Bennett |
| 2005/0131558 A1 | 6/2005 | Braithwaite et al. | 2008/0007650 A1 | 1/2008 | Bennett |
| 2005/0144284 A1 | 6/2005 | Ludwig et al. | 2008/0007651 A1 | 1/2008 | Bennett |
| 2005/0147261 A1 | 7/2005 | Yeh | 2008/0018785 A1 | 1/2008 | Bennett |
| 2005/0154766 A1 | 7/2005 | Huang et al. | 2008/0022320 A1 | 1/2008 | Ver Steeg |
| 2005/0159833 A1 | 7/2005 | Giamo et al. | 2008/0025535 A1 | 1/2008 | Rajapakse |
| 2005/0160270 A1 | 7/2005 | Goldberg et al. | 2008/0045140 A1 | 2/2008 | Korhonen et al. |
| 2005/0166135 A1 | 7/2005 | Burke et al. | 2008/0065232 A1 | 3/2008 | Igoe |
| 2005/0168630 A1 | 8/2005 | Yamada et al. | 2008/0066094 A1 | 3/2008 | Igoe |
| 2005/0177256 A1 | 8/2005 | Shintani et al. | 2008/0066120 A1 | 3/2008 | Igoe |
| 2005/0177643 A1 | 8/2005 | Xu | 2008/0072816 A1 | 3/2008 | Riess et al. |
| 2005/0181348 A1 | 8/2005 | Carey et al. | 2008/0075295 A1 | 3/2008 | Mayman et al. |
| 2005/0195205 A1 | 9/2005 | Abrams, Jr. | 2008/0077261 A1 | 3/2008 | Baudino et al. |
| 2005/0195823 A1 | 9/2005 | Chen et al. | 2008/0077619 A1 | 3/2008 | Gilley et al. |
| 2005/0195999 A1 | 9/2005 | Takemura et al. | 2008/0077620 A1 | 3/2008 | Gilley et al. |
| 2005/0197725 A1 | 9/2005 | Alexander et al. | 2008/0086318 A1 | 4/2008 | Gilley et al. |
| 2005/0198574 A1 | 9/2005 | Lamkin et al. | 2008/0091771 A1 | 4/2008 | Allen et al. |
| 2005/0201549 A1 | 9/2005 | Dedieu et al. | 2008/0092204 A1 | 4/2008 | Bryce et al. |
| | | | 2008/0120429 A1 | 5/2008 | Millington et al. |
| | | | 2008/0126943 A1 | 5/2008 | Parasnis et al. |
| | | | 2008/0144861 A1 | 6/2008 | Melanson et al. |
| | | | 2008/0144864 A1 | 6/2008 | Huon et al. |

US 10,469,966 B2

Page 8

(56)

References Cited

U.S. PATENT DOCUMENTS

| | | | | | |
|-----------------|---------|----------------------|-----------------|---------|-----------------------|
| 2008/0146289 A1 | 6/2008 | Korneluk et al. | 2013/0041954 A1 | 2/2013 | Kim et al. |
| 2008/0152165 A1 | 6/2008 | Zacchi | 2013/0047084 A1 | 2/2013 | Sanders et al. |
| 2008/0159545 A1 | 7/2008 | Takumai et al. | 2013/0051572 A1 | 2/2013 | Goh et al. |
| 2008/0162668 A1 | 7/2008 | Miller | 2013/0052940 A1 | 2/2013 | Brillhart et al. |
| 2008/0189272 A1 | 8/2008 | Powers et al. | 2013/0070093 A1 | 3/2013 | Rivera et al. |
| 2008/0205070 A1 | 8/2008 | Osada | 2013/0080599 A1 | 3/2013 | Ko et al. |
| 2008/0212786 A1 | 9/2008 | Park | 2013/0094670 A1 | 4/2013 | Millington |
| 2008/0215169 A1 | 9/2008 | Debettencourt et al. | 2013/0124664 A1 | 5/2013 | Fonseca, Jr. et al. |
| 2008/0242222 A1 | 10/2008 | Bryce et al. | 2013/0129122 A1 | 5/2013 | Johnson et al. |
| 2008/0247554 A1 | 10/2008 | Caffrey | 2013/0132837 A1 | 5/2013 | Mead et al. |
| 2008/0263010 A1 | 10/2008 | Roychoudhuri et al. | 2013/0159126 A1 | 6/2013 | Elkady |
| 2008/0291863 A1 | 11/2008 | Agren | 2013/0167029 A1 | 6/2013 | Friesen et al. |
| 2008/0303947 A1 | 12/2008 | Ohnishi et al. | 2013/0174100 A1 | 7/2013 | Seymour et al. |
| 2009/0011798 A1 | 1/2009 | Yamada | 2013/0174223 A1 | 7/2013 | Dykeman et al. |
| 2009/0017868 A1 | 1/2009 | Ueda et al. | 2013/0179163 A1 | 7/2013 | Herbig et al. |
| 2009/0031336 A1 | 1/2009 | Chavez et al. | 2013/0191454 A1 | 7/2013 | Oliver et al. |
| 2009/0060219 A1 | 3/2009 | Inohara | 2013/0197682 A1 | 8/2013 | Millington |
| 2009/0070434 A1 | 3/2009 | Himmelstein | 2013/0208911 A1 | 8/2013 | Millington |
| 2009/0089327 A1 | 4/2009 | Kalaboukis et al. | 2013/0208921 A1 | 8/2013 | Millington |
| 2009/0097672 A1 | 4/2009 | Buil et al. | 2013/0226323 A1 | 8/2013 | Millington |
| 2009/0100189 A1 | 4/2009 | Bahren et al. | 2013/0230175 A1 | 9/2013 | Bech et al. |
| 2009/0124289 A1 | 5/2009 | Nishida | 2013/0232416 A1 | 9/2013 | Millington |
| 2009/0157905 A1 | 6/2009 | Davis | 2013/0236029 A1 | 9/2013 | Millington |
| 2009/0164655 A1 | 6/2009 | Pettersson et al. | 2013/0243199 A1 | 9/2013 | Kallai et al. |
| 2009/0169030 A1 | 7/2009 | Inohara | 2013/0253679 A1 | 9/2013 | Lambourne |
| 2009/0180632 A1 | 7/2009 | Goldberg et al. | 2013/0253934 A1 | 9/2013 | Parekh et al. |
| 2009/0193345 A1 | 7/2009 | Wensley et al. | 2013/0259254 A1 | 10/2013 | Xiang et al. |
| 2009/0222115 A1 | 9/2009 | Malcolm et al. | 2013/0279706 A1 | 10/2013 | Marti et al. |
| 2009/0228919 A1 | 9/2009 | Zott et al. | 2013/0287186 A1 | 10/2013 | Quady |
| 2009/0232326 A1 | 9/2009 | Gordon et al. | 2013/0290504 A1 | 10/2013 | Quady |
| 2009/0251604 A1 | 10/2009 | Iyer | 2013/0293345 A1 | 11/2013 | Lambourne |
| 2010/0004983 A1 | 1/2010 | Dickerson et al. | 2014/0006483 A1 | 1/2014 | Garmark et al. |
| 2010/0010651 A1 | 1/2010 | Kirkeby et al. | 2014/0016784 A1 | 1/2014 | Sen et al. |
| 2010/0031366 A1 | 2/2010 | Knight et al. | 2014/0016786 A1 | 1/2014 | Sen |
| 2010/0049835 A1 | 2/2010 | Ko et al. | 2014/0016802 A1 | 1/2014 | Sen |
| 2010/0052843 A1 | 3/2010 | Cannistraro | 2014/0023196 A1 | 1/2014 | Xiang et al. |
| 2010/0067716 A1 | 3/2010 | Katayama | 2014/0037097 A1 | 2/2014 | Labosco |
| 2010/0087089 A1 | 4/2010 | Struthers et al. | 2014/0064501 A1 | 3/2014 | Olsen et al. |
| 2010/0142735 A1 | 6/2010 | Yoon et al. | 2014/0075308 A1 | 3/2014 | Sanders et al. |
| 2010/0153097 A1 | 6/2010 | Hotho et al. | 2014/0075311 A1 | 3/2014 | Boettcher et al. |
| 2010/0228740 A1 | 9/2010 | Cannistraro et al. | 2014/0079242 A1 | 3/2014 | Nguyen et al. |
| 2010/0272270 A1 | 10/2010 | Chaikin et al. | 2014/0108929 A1 | 4/2014 | Garmark et al. |
| 2010/0284389 A1 | 11/2010 | Ramsay et al. | 2014/0112481 A1 | 4/2014 | Li et al. |
| 2010/0290643 A1 | 11/2010 | Mihelich et al. | 2014/0123005 A1 | 5/2014 | Forstall et al. |
| 2010/0299639 A1 | 11/2010 | Ramsay et al. | 2014/0140530 A1 | 5/2014 | Gomes-Casseres et al. |
| 2011/0001632 A1 | 1/2011 | Hohorst | 2014/0161265 A1 | 6/2014 | Chaikin et al. |
| 2011/0002487 A1 | 1/2011 | Panther et al. | 2014/0181569 A1 | 6/2014 | Millington et al. |
| 2011/0044476 A1 | 2/2011 | Burlingame et al. | 2014/0219456 A1 | 8/2014 | Morrell et al. |
| 2011/0066943 A1 | 3/2011 | Brillon et al. | 2014/0226823 A1 | 8/2014 | Sen et al. |
| 2011/0110533 A1 | 5/2011 | Choi et al. | 2014/0242913 A1 | 8/2014 | Pang |
| 2011/0170710 A1 | 7/2011 | Son | 2014/0256260 A1 | 9/2014 | Ueda et al. |
| 2011/0228944 A1 | 9/2011 | Croghan et al. | 2014/0267148 A1 | 9/2014 | Luna et al. |
| 2011/0299696 A1 | 12/2011 | Holmgren et al. | 2014/0270202 A1 | 9/2014 | Ivanov et al. |
| 2011/0316768 A1 | 12/2011 | McRae | 2014/0273859 A1 | 9/2014 | Luna et al. |
| 2012/0029671 A1 | 2/2012 | Millington et al. | 2014/0279889 A1 | 9/2014 | Luna et al. |
| 2012/0030366 A1 | 2/2012 | Collart et al. | 2014/0285313 A1 | 9/2014 | Luna et al. |
| 2012/0047435 A1 | 2/2012 | Holladay et al. | 2014/0286496 A1 | 9/2014 | Luna et al. |
| 2012/0051558 A1 | 3/2012 | Kim et al. | 2014/0294200 A1 | 10/2014 | Baumgarte et al. |
| 2012/0051567 A1 | 3/2012 | Castor-Perry | 2014/0298174 A1 | 10/2014 | Ikonomov |
| 2012/0060046 A1 | 3/2012 | Millington | 2014/0323036 A1 | 10/2014 | Daley et al. |
| 2012/0127831 A1 | 5/2012 | Gicklhorn et al. | 2014/0344689 A1 | 11/2014 | Scott et al. |
| 2012/0129446 A1 | 5/2012 | Ko et al. | 2014/0355768 A1 | 12/2014 | Sen et al. |
| 2012/0148075 A1 | 6/2012 | Goh et al. | 2014/0355794 A1 | 12/2014 | Morrell et al. |
| 2012/0185771 A1 | 7/2012 | Rothkopf et al. | 2014/0378056 A1 | 12/2014 | Liu et al. |
| 2012/0192071 A1 | 7/2012 | Millington | 2015/0019670 A1 | 1/2015 | Redmann |
| 2012/0207290 A1 | 8/2012 | Moyers et al. | 2015/0026613 A1 | 1/2015 | Kwon et al. |
| 2012/0237054 A1 | 9/2012 | Eo et al. | 2015/0032844 A1 | 1/2015 | Tarr et al. |
| 2012/0263325 A1 | 10/2012 | Freeman et al. | 2015/0043736 A1 | 2/2015 | Olsen et al. |
| 2012/0281058 A1 | 11/2012 | Laney et al. | 2015/0049248 A1 | 2/2015 | Wang et al. |
| 2012/0290621 A1 | 11/2012 | Heitz, III et al. | 2015/0063610 A1 | 3/2015 | Mossner |
| 2013/0010970 A1 | 1/2013 | Hegarty et al. | 2015/0074527 A1 | 3/2015 | Sevigny et al. |
| 2013/0018960 A1 | 1/2013 | Knysz et al. | 2015/0074528 A1 | 3/2015 | Sakalowsky et al. |
| 2013/0028443 A1 | 1/2013 | Pance et al. | 2015/0098576 A1 | 4/2015 | Sundaresan et al. |
| 2013/0031475 A1 | 1/2013 | Maor et al. | 2015/0139210 A1 | 5/2015 | Marin et al. |
| 2013/0038726 A1 | 2/2013 | Kim | 2015/0146886 A1 | 5/2015 | Baumgarte |
| | | | 2015/0201274 A1 | 7/2015 | Ellner et al. |
| | | | 2015/0256954 A1 | 9/2015 | Carlsson et al. |
| | | | 2015/0281866 A1 | 10/2015 | Williams et al. |
| | | | 2015/0286360 A1 | 10/2015 | Wachter et al. |

US 10,469,966 B2

Page 9

(56)

References Cited

U.S. PATENT DOCUMENTS

2015/0304288 A1 10/2015 Balasaygun et al.
 2015/0365987 A1 12/2015 Weel
 2017/0188152 A1 6/2017 Watson et al.

FOREIGN PATENT DOCUMENTS

CN 101095372 A 12/2007
 CN 101292500 A 10/2008
 CN 101785182 A 7/2010
 EP 0251584 A2 1/1988
 EP 0672985 A1 9/1995
 EP 0772374 A2 5/1997
 EP 1111527 A2 6/2001
 EP 1122931 A2 8/2001
 EP 1133896 B1 8/2002
 EP 1312188 A1 5/2003
 EP 1389853 A1 2/2004
 EP 2713281 4/2004
 EP 1517464 A2 3/2005
 EP 0895427 A3 1/2006
 EP 1416687 B1 8/2006
 EP 1410686 3/2008
 EP 2043381 A2 4/2009
 EP 2161950 A2 3/2010
 EP 1825713 B1 10/2012
 EP 0742674 B1 4/2014
 EP 2591617 B1 6/2014
 EP 2860992 A1 4/2015
 GB 2284327 A 5/1995
 GB 2338374 12/1999
 GB 2379533 A 3/2003
 GB 2486183 6/2012
 JP 63269633 11/1988
 JP 07-210129 8/1995
 JP 2000149391 A 5/2000
 JP 2001034951 2/2001
 JP 2002111817 4/2002
 JP 2002123267 A 4/2002
 JP 2002358241 A 12/2002
 JP 2003037585 2/2003
 JP 2003506765 A 2/2003
 JP 2003101958 4/2003
 JP 2003169089 A 6/2003
 JP 2004193868 A 7/2004
 JP 2005108427 4/2005
 JP 2005136457 5/2005
 JP 2007241652 A 9/2007
 JP 2007288405 A 11/2007
 JP 2009506603 A 2/2009
 JP 2009135750 6/2009
 JP 2009218888 9/2009
 JP 2009535708 10/2009
 JP 2009538006 A 10/2009
 JP 2011010183 A 1/2011
 JP 2011130496 6/2011
 JP 2011176581 9/2011
 TW 439027 6/2001
 WO 199525313 9/1995
 WO 1999023560 5/1999
 WO 199961985 12/1999
 WO 0019693 A1 4/2000
 WO 2000019693 A1 4/2000
 WO 0110125 A1 2/2001
 WO 200153994 7/2001
 WO 02073851 9/2002
 WO 03093950 A2 11/2003
 WO 2003093950 A2 11/2003
 WO 2005013047 A2 2/2005
 WO 2007023120 A1 3/2007
 WO 2007127485 11/2007
 WO 2007131555 11/2007
 WO 2007135581 A2 11/2007
 WO 2008082350 A1 7/2008
 WO 2008114389 A1 9/2008
 WO 2012050927 4/2012

WO 2012137190 A1 10/2012
 WO 2013012582 1/2013
 WO 2014004182 1/2014
 WO 2014149533 A2 9/2014
 WO 2015024881 A1 2/2015

OTHER PUBLICATIONS

Non-Final Office Action dated Nov. 19, 2014, issued in connection with U.S. Appl. No. 13/848,921, filed Mar. 22, 2013, 9 pages.
 Non-Final Office Action dated Aug. 20, 2009, issued in connection with U.S. Appl. No. 11/906,702, filed Oct. 2, 2007, 27 pages.
 Non-Final Office Action dated Oct. 20, 2016, issued in connection with U.S. Appl. No. 14/563,515, filed Dec. 8, 2014, 10 pages.
 Non-Final Office Action dated Sep. 21, 2016, issued in connection with U.S. Appl. No. 15/080,591, filed Mar. 25, 2016, 9 pages.
 Non-Final Office Action dated Sep. 21, 2016, issued in connection with U.S. Appl. No. 15/080,716, filed Mar. 25, 2016, 8 pages.
 Non-Final Office Action dated Sep. 21, 2016, issued in connection with U.S. Appl. No. 15/088,283, filed Apr. 1, 2016, 9 pages.
 Non-Final Office Action dated Sep. 21, 2016, issued in connection with U.S. Appl. No. 15/088,532, filed Apr. 1, 2016, 9 pages.
 Non-Final Office Action dated Aug. 22, 2018, issued in connection with U.S. Appl. No. 15/487,686, filed Apr. 14, 2017, 13 pages.
 Non-Final Office Action dated Dec. 22, 2014, issued in connection with U.S. Appl. No. 13/458,558, filed Apr. 27, 2012, 11 pages.
 Non-Final Office Action dated Sep. 22, 2016, issued in connection with U.S. Appl. No. 15/088,906, filed Apr. 1, 2016, 9 pages.
 Non-Final Office Action dated Sep. 22, 2016, issued in connection with U.S. Appl. No. 15/155,149, filed May 16, 2016, 7 pages.
 Non-Final Office Action dated Jun. 23, 2015, issued in connection with U.S. Appl. No. 13/705,176, filed Dec. 5, 2012, 30 pages.
 Non-Final Office Action dated Mar. 23, 2015, issued in connection with U.S. Appl. No. 14/299,847, filed Jun. 9, 2014, 14 pages.
 Non-Final Office Action dated Oct. 23, 2014, issued in connection with U.S. Appl. No. 13/848,904, filed Mar. 22, 2013, 11 pages.
 Non-Final Office Action dated Oct. 23, 2014, issued in connection with U.S. Appl. No. 13/864,251, filed Apr. 17, 2013, 11 pages.
 Non-Final Office Action dated Oct. 23, 2014, issued in connection with U.S. Appl. No. 13/888,203, filed May 6, 2013, 9 pages.
 Non-Final Office Action dated Sep. 23, 2014, issued in connection with U.S. Appl. No. 13/630,565, filed Sep. 28, 2012, 7 pages.
 Non-Final Office Action dated Feb. 24, 2017, issued in connection with U.S. Appl. No. 14/619,813, filed Feb. 11, 2015, 9 pages.
 Non-Final Office Action dated May 24, 2016, issued in connection with U.S. Appl. No. 15/134,767, filed Apr. 21, 2016, 12 pages.
 Non-Final Office Action dated Oct. 24, 2014, issued in connection with U.S. Appl. No. 13/435,776, filed Mar. 30, 2012, 14 pages.
 Non-Final Office Action dated Apr. 25, 2018, issued in connection with U.S. Appl. No. 15/130,919, filed Apr. 15, 2016, 13 pages.
 Non-Final Office Action dated Feb. 26, 2015, issued in connection with U.S. Appl. No. 14/186,850, filed Feb. 21, 2014, 25 pages.
 Non-Final Office Action dated Mar. 26, 2015, issued in connection with U.S. Appl. No. 14/184,528, filed Feb. 19, 2014, 18 pages.
 Non-Final Office Action dated Jan. 27, 2015, issued in connection with U.S. Appl. No. 14/465,457, filed Aug. 21, 2014, 11 pages.
 Non-Final Office Action dated Jun. 27, 2008, issued in connection with U.S. Appl. No. 10/861,653, filed Jun. 5, 2004, 19 pages.
 Non-Final Office Action dated Mar. 27, 2015, issued in connection with U.S. Appl. No. 13/705,178, filed Dec. 5, 2012, 14 pages.
 Non-Final Office Action dated Sep. 27, 2013, issued in connection with U.S. Appl. No. 13/013,740, filed Jan. 25, 2011, 12 pages.
 Non-Final Office Action dated Sep. 27, 2016, issued in connection with U.S. Appl. No. 15/228,685, filed Aug. 4, 2016, 8 pages.
 Non-Final Office Action dated Dec. 28, 2015, issued in connection with U.S. Appl. No. 14/290,493, filed May 29, 2014, 29 pages.
 Non-Final Office Action dated Dec. 28, 2016, issued in connection with U.S. Appl. No. 15/343,000, filed Nov. 3, 2016, 11 pages.
 Non-Final Office Action dated Jan. 29, 2016, issued in connection with U.S. Appl. No. 14/937,523, filed Nov. 10, 2015, 10 pages.
 Non-Final Office Action dated Jun. 29, 2016, issued in connection with U.S. Appl. No. 14/629,937, filed Feb. 24, 2015, 12 pages.

US 10,469,966 B2

Page 10

(56)

References Cited

OTHER PUBLICATIONS

Non-Final Office Action dated Apr. 30, 2012, issued in connection with U.S. Appl. No. 13/204,511, filed Aug. 5, 2011, 16 pages.

Non-Final Office Action dated Jan. 30, 2015, issued in connection with U.S. Appl. No. 14/290,493, filed May 29, 2014, 29 pages.

Non-Final Office Action dated Jan. 30, 2015, issued in connection with U.S. Appl. No. 14/504,812, filed Oct. 2, 2014, 13 pages.

Non-Final Office Action dated Nov. 30, 2016, issued in connection with U.S. Appl. No. 15/243,186, filed Aug. 22, 2016, 12 pages.

Non-Final Office Action dated Oct. 30, 2018, issued in connection with U.S. Appl. No. 16/128,443, filed Sep. 11, 2018, 21 pages.

Non-Final Office Action dated Sep. 30, 2016, issued in connection with U.S. Appl. No. 13/864,249, filed Apr. 17, 2013, 12 pages.

Non-Final Office Action dated Oct. 31, 2016, issued in connection with U.S. Appl. No. 14/806,070, filed Jul. 22, 2015, 11 pages.

North American MPEG-2 Information, "The MPEG-2 Transport Stream," Retrieved from the Internet: URL: <http://www.coolstf.mpeg/fts>, 2006, pp. 1-5.

Notice of Allowability dated Apr. 18, 2013, issued in connection with U.S. Appl. No. 11/853,790, filed Sep. 11, 2007, 4 pages.

Notice of Allowance dated Jan. 31, 2013, issued in connection with U.S. Appl. No. 13/298,090, filed Nov. 16, 2011, 19 pages.

Notice of Allowance dated Dec. 1, 2016, issued in connection with U.S. Appl. No. 15/088,283, filed Apr. 1, 2016, 9 pages.

Notice of Allowance dated Jun. 1, 2017, issued in connection with U.S. Appl. No. 14/808,397, filed Jul. 24, 2015, 5 pages.

Notice of Allowance dated Dec. 2, 2016, issued in connection with U.S. Appl. No. 15/088,532, filed Apr. 1, 2016, 9 pages.

Notice of Allowance dated Dec. 2, 2016, issued in connection with U.S. Appl. No. 15/088,678, filed Apr. 1, 2016, 9 pages.

Notice of Allowance dated Dec. 2, 2016, issued in connection with U.S. Appl. No. 15/089,758, filed Apr. 4, 2016, 9 pages.

Notice of Allowance dated Dec. 2, 2016, issued in connection with U.S. Appl. No. 15/155,149, filed May 16, 2016, 9 pages.

Notice of Allowance dated Jul. 2, 2015, issued in connection with U.S. Appl. No. 13/848,904, filed Mar. 22, 2013, 17 pages.

Notice of Allowance dated Jul. 2, 2015, issued in connection with U.S. Appl. No. 13/888,203, filed May 6, 2013, 19 pages.

"ZR-8630AV MultiZone Audio/Video Receiver, Installation and Operation Guide," Niles Audio Corporation, 2003, 86 pages.

ZX135: Installation Manual, LA Audio, Apr. 2003, 44 pages.

Sonos, Inc. v. D&M Holdings, Inc., Defendants' Final Invalidation Contentions (Jan. 18, 2017) (106 pages).

Sonos, Inc. v. D&M Holdings, DI 226, Opinion Denying Inequitable Conduct Defenses, Feb. 6, 2017, updated, 5 pages.

Sonos, Inc. v. D&M Holdings, DI 242, US District Judge Andrews 101 Opinion, Mar. 2017, 16 pages.

Sonos, Inc. v. D&M Holdings, Sonos Supp Opening Markman Brief including Exhibits, Mar. 3, 2017, 17 pages.

Sonos, Inc. v. D&M Holdings, Sonos Supp Reply Markman Brief including Exhibits, Mar. 29, 2017, 36 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Declaration of Steven C. Visser, executed Sep. 9, 2016, 40 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidation Contentions Exhibit 1: Defendants' Invalidation Contentions for U.S. Pat. No. 7,571,014 filed Sep. 16, 2016, 270 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidation Contentions Exhibit 10: Defendants' Invalidation Contentions for U.S. Pat. No. 9,219,959 filed Sep. 27, 2016, 236 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidation Contentions Exhibit 11: Defendants' Invalidation Contentions for Design U.S. Pat. No. D. 559,197 filed Sep. 27, 2016, 52 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidation Contentions Exhibit 2: Defendants' Invalidation Contentions for U.S. Pat. No. 8,588,949 filed Sep. 27, 2016, 224 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidation Contentions Exhibit 3: Defendants' Invalidation Contentions for U.S. Pat. No. 8,843,224 filed Sep. 27, 2016, 147 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidation Contentions Exhibit 4: Defendants' Invalidation Contentions for U.S. Pat. No. 8,938,312 filed Sep. 27, 2016, 229 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidation Contentions Exhibit 5: Defendants' Invalidation Contentions for U.S. Pat. No. 8,938,637 filed Sep. 27, 2016, 213 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidation Contentions Exhibit 6: Defendants' Invalidation Contentions for U.S. Pat. No. 9,042,556 filed Sep. 27, 2016, 162 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidation Contentions Exhibit 7: Defendants' Invalidation Contentions for U.S. Pat. No. 9,195,258 filed Sep. 27, 2016, 418 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidation Contentions Exhibit 8: Defendants' Invalidation Contentions for U.S. Pat. No. 9,202,509 filed Sep. 27, 2016, 331 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidation Contentions Exhibit 9: Defendants' Invalidation Contentions for U.S. Pat. No. 9,213,357 filed Sep. 27, 2016, 251 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidation Contentions Exhibit 1: Defendants' Invalidation Contentions for U.S. Pat. No. 7,571,014 filed Apr. 15, 2016, 161 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidation Contentions Exhibit 10: Defendants' Invalidation Contentions for U.S. Pat. No. 9,213,357 filed Apr. 15, 2016, 244 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidation Contentions Exhibit 11: Defendants' Invalidation Contentions for U.S. Pat. No. 9,219,959 filed Apr. 15, 2016, 172 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidation Contentions Exhibit 12: Defendants' Invalidation Contentions for Design U.S. Pat. No. D. 559,197 filed Apr. 15, 2016, 36 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidation Contentions Exhibit 2: Defendants' Invalidation Contentions for U.S. Pat. No. 8,588,949 filed Apr. 15, 2016, 112 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidation Contentions Exhibit 3: Defendants' Invalidation Contentions for U.S. Pat. No. 8,843,224 filed Apr. 15, 2016, 118 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidation Contentions Exhibit 4: Defendants' Invalidation Contentions for U.S. Pat. No. 8,938,312 filed Apr. 15, 2016, 217 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidation Contentions Exhibit 5: Defendants' Invalidation Contentions for U.S. Pat. No. 8,938,637 filed Apr. 15, 2016, 177 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidation Contentions Exhibit 6: Defendants' Invalidation Contentions for U.S. Pat. No. 9,042,556 filed Apr. 15, 2016, 86 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidation Contentions Exhibit 7: Defendants' Invalidation Contentions for U.S. Pat. No. 9,130,771 filed Apr. 15, 2016, 203 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidation Contentions Exhibit 8: Defendants' Invalidation Contentions for U.S. Pat. No. 9,195,258 filed Apr. 15, 2016, 400 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidation Contentions Exhibit 9: Defendants' Invalidation Contentions for U.S. Pat. No. 9,202,509 filed Apr. 15, 2016, 163 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Preliminary Identification of Prior Art References, provided Jul. 29, 2016, 5 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendants' Brief in Support of their Motion for Leave to Amend their Answer to Add the Defense of Inequitable Conduct, provided Oct. 12, 2016, 24 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendants' Opposition to Sonos's Motion to Strike Defendants' New Amended Answer Submitted with their Reply, provided Oct. 3, 2016, 15 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Exhibit A: Defendants' Second Amended Answer to Plaintiffs' Third Amended complaint, provided Oct. 12, 2016, 43 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Exhibit B: Defendants' Second Amended Answer to Plaintiffs' Third Amended Complaint, provided Oct. 12, 2016, 43 pages.

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(56)

References Cited

OTHER PUBLICATIONS

Sonos, Inc. v. D&M Holdings Inc. et al., Opening Brief in Support of Defendants' Motion for Leave to Amend Their Answer to Add the Defense of Inequitable Conduct, provided Aug. 1, 2016, 11 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Order, provided Oct. 7, 2016, 2 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Plaintiff's Opposition to Defendants' Motion for Leave to Amend Their Answer to Add the Defense of Inequitable Conduct, provided Aug. 26, 2016, 25 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Redlined Exhibit B: Defendants' First Amended Answer to Plaintiffs' Third Amended Complaint, provided Aug. 1, 2016, 27 pages.

Sonos, Inc. v. D&M Holdings, DI 206-1, Transcript of 101 Hearing (Nov. 28, 2016) (28 pages).

Sonos, Inc. v. D&M Holdings, DI 207, Public Joint Claim Construction Brief (Nov. 30, 2016) (88 pages).

Sonos, Inc. v. D&M Holdings, DI 214, D&M Post-Markman Letter (Dec. 22, 2016) (13 pages).

Sonos, Inc. v. D&M Holdings, DI 215, Sonos Post-Markman Letter (Dec. 22, 2016) (15 pages).

Sonos, Inc. v. D&M Holdings, DI 219, Claim Construction Opinion (Jan. 12, 2017) (24 pages).

Sonos, Inc. v. D&M Holdings, DI 221, Claim Construction Order (Jan. 18, 2017) (2 pages).

Sonos, Inc. v. D&M Holdings, Markman Hearing Transcript (Dec. 14, 2016) (69 pages).

Sonos Multi-Room Music System User Guide, Version: 091001, 2009, 299 pages.

Sonos Play:3 Product Guide; copyright 2004-2011; 2 pages.

Sonos Play:3 Product Guide; copyright 2004-2012; 14 pages.

Sonos Play:3 Product Guide; copyright 2004-2013; 15 pages.

Sonos Play:3 Teardown; <https://www.ifixit.com/Teardown/Sonos+Play%3A3+Teardown/12475>; 11 pages.

Non-Final Office Action dated May 27, 2014, issued in connection with U.S. Appl. No. 14/186,850, filed Feb. 21, 2014, 13 pages.

Non-Final Office Action dated Feb. 29, 2012, issued in connection with U.S. Appl. No. 13/297,000, filed Nov. 15, 2011, 10 pages.

Non-Final Office Action dated Nov. 29, 2010, issued in connection with U.S. Appl. No. 11/801,468, filed May 9, 2007, 17 pages.

Non-Final Office Action dated Jul. 30, 2013 issued in connection with U.S. Appl. No. 13/724,048, filed Dec. 21, 2012, 7 pages.

Non-Final Office Action dated Jul. 31, 2014, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 31 pages.

Non-Final Office Action dated Dec. 1, 2014, issued in connection with U.S. Appl. No. 14/516,867, filed Oct. 17, 2014, 11 pages.

Non-Final Office Action dated Jun. 1, 2016, issued in connection with U.S. Appl. No. 14/184,522, filed Feb. 19, 2014, 21 pages.

Non-Final Office Action dated Jan. 3, 2017, issued in connection with U.S. Appl. No. 14/808,397, filed Jul. 24, 2015, 11 pages.

Non-Final Office Action dated Jun. 3, 2015, issued in connection with U.S. Appl. No. 14/564,544, filed Dec. 9, 2014, 7 pages.

Non-Final Office Action dated Nov. 3, 2016, issued in connection with U.S. Appl. No. 14/184,528, filed Feb. 19, 2014, 17 pages.

Non-Final Office Action dated Jan. 4, 2017, issued in connection with U.S. Appl. No. 14/825,961, filed Aug. 13, 2015, 11 pages.

Non-Final Office Action dated Jun. 4, 2015, issued in connection with U.S. Appl. No. 13/871,795, filed Apr. 26, 2013, 16 pages.

Non-Final Office Action dated Mar. 4, 2015, issued in connection with U.S. Appl. No. 13/435,776, filed Mar. 30, 2012, 16 pages.

Non-Final Office Action dated Oct. 4, 2016, issued in connection with U.S. Appl. No. 15/089,758, filed Apr. 4, 2016, 9 pages.

Non-Final Office Action dated Oct. 5, 2016, issued in connection with U.S. Appl. No. 13/864,250, filed Apr. 17, 2013, 10 pages.

Non-Final Office Action dated Oct. 5, 2016, issued in connection with U.S. Appl. No. 13/864,252, filed Apr. 17, 2013, 11 pages.

Non-Final Office Action dated Oct. 6, 2016, issued in connection with U.S. Appl. No. 15/088,678, filed Apr. 1, 2016, 9 pages.

Non-Final Office Action dated Jul. 7, 2015, issued in connection with U.S. Appl. No. 14/174,244, filed Feb. 6, 2014, 9 pages.

Non-Final Office Action dated Oct. 7, 2016, issued in connection with U.S. Appl. No. 15/156,392, filed May 17, 2016, 8 pages.

Non-Final Office Action dated Mar. 8, 2011, issued in connection with U.S. Appl. No. 11/853,790, filed Sep. 11, 2007, 10 pages.

Non-Final Office Action dated Mar. 8, 2016, issued in connection with U.S. Appl. No. 13/848,921, filed Mar. 22, 2013, 13 pages.

Non-Final Office Action dated Aug. 9, 2016, issued in connection with U.S. Appl. No. 13/871,795, filed Apr. 26, 2013, 31 pages.

Non-Final Office Action dated May 9, 2014, issued in connection with U.S. Appl. No. 13/892,230, filed May 10, 2013, 10 pages.

Non-Final Office Action dated Nov. 1, 2018, issued in connection with U.S. Appl. No. 16/129,758, filed Sep. 12, 2018, 23 pages.

Non-Final Office Action dated Feb. 10, 2016, issued in connection with U.S. Appl. No. 14/937,571, filed Nov. 10, 2015, 9 pages.

Non-Final Office Action dated Mar. 10, 2011, issued in connection with U.S. Appl. No. 12/035,112, filed Feb. 21, 2008, 12 pages.

Non-Final Office Action dated May 10, 2016, issued in connection with U.S. Appl. No. 14/504,812, filed Oct. 2, 2014, 22 pages.

Non-Final Office Action dated Nov. 10, 2016, issued in connection with U.S. Appl. No. 15/243,355, filed Aug. 22, 2016, 11 pages.

Non-Final Office Action dated Jun. 11, 2018, issued in connection with U.S. Appl. No. 15/405,931, filed Jan. 13, 2017, 14 pages.

Non-Final Office Action dated Dec. 12, 2016, issued in connection with U.S. Appl. No. 15/343,019, filed Nov. 3, 2016, 8 pages.

Non-Final Office Action dated Jun. 12, 2015, issued in connection with U.S. Appl. No. 13/848,932, filed Mar. 22, 2013, 16 pages.

Non-Final Office Action dated Mar. 12, 2015, issued in connection with U.S. Appl. No. 13/705,174, filed Dec. 5, 2012, 13 pages.

Non-Final Office Action dated Oct. 12, 2016, issued in connection with U.S. Appl. No. 14/505,966, filed Oct. 3, 2014, 10 pages.

Non-Final Office Action dated Feb. 13, 2014, issued in connection with U.S. Appl. No. 13/896,037, filed May 16, 2013, 10 pages.

Non-Final Office Action dated Feb. 13, 2015, issued in connection with U.S. Appl. No. 13/013,740, filed Jan. 25, 2011, 14 pages.

Non-Final Office Action dated Jan. 13, 2016, issued in connection with U.S. Appl. No. 14/184,528, filed Feb. 19, 2014, 14 pages.

Non-Final Office Action dated Jun. 13, 2016, issued in connection with U.S. Appl. No. 14/620,937, filed Feb. 12, 2015, 12 pages.

Non-Final Office Action dated Jun. 13, 2016, issued in connection with U.S. Appl. No. 15/134,761, filed Apr. 21, 2016, 10 pages.

Non-Final Office Action dated Mar. 13, 2015, issued in connection with U.S. Appl. No. 13/705,177, filed Dec. 5, 2012, 15 pages.

Non-Final Office Action dated May 14, 2018, issued in connection with U.S. Appl. No. 15/228,812, filed Aug. 4, 2016, 15 pages.

Non-Final Office Action dated Dec. 15, 2016, issued in connection with U.S. Appl. No. 13/458,558, filed Apr. 27, 2012, 12 pages.

Non-Final Office Action dated Jul. 15, 2015, issued in connection with U.S. Appl. No. 14/174,253, filed Feb. 6, 2014, 9 pages.

Non-Final Office Action dated Nov. 16, 2016, issued in connection with U.S. Appl. No. 15/228,639, filed Aug. 4, 2016, 15 pages.

Non-Final Office Action dated Dec. 17, 2015, issued in connection with U.S. Appl. No. 13/458,558, filed Apr. 27, 2012, 10 pages.

Non-Final Office Action dated Nov. 17, 2014, issued in connection with U.S. Appl. No. 13/864,247, filed Apr. 17, 2013, 11 pages.

Non-Final Office Action dated Nov. 17, 2016, issued in connection with U.S. Appl. No. 14/620,937, filed Feb. 12, 2015, 14 pages.

Non-Final Office Action dated Feb. 18, 2009, issued in connection with U.S. Appl. No. 10/861,653, filed Jun. 5, 2004, 18 pages.

Non-Final Office Action dated Nov. 18, 2014, issued in connection with U.S. Appl. No. 13/435,739, filed Mar. 30, 2012, 10 pages.

Non-Final Office Action dated Jan. 19, 2018, issued in connection with U.S. Appl. No. 14/629,937, filed Feb. 24, 2015, 14 pages.

Non-Final Office Action dated Jun. 19, 2015, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 38 pages.

Notice of Allowance dated Oct. 24, 2016, issued in connection with U.S. Appl. No. 15/134,767, filed Apr. 21, 2016, 7 pages.

Notice of Allowance dated Sep. 24, 2015, issued in connection with U.S. Appl. No. 13/705,174, filed Dec. 5, 2012, 7 pages.

Notice of Allowance dated Sep. 24, 2015, issued in connection with U.S. Appl. No. 14/184,935, filed Feb. 20, 2014, 7 pages.

Notice of Allowance dated Aug. 25, 2017, issued in connection with U.S. Appl. No. 14/505,966, filed Oct. 3, 2014, 5 pages.

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(56)

References Cited

OTHER PUBLICATIONS

Notice of Allowance dated Sep. 25, 2014, issued in connection with U.S. Appl. No. 14/176,808, filed Feb. 10, 2014, 5 pages.

Notice of Allowance dated Aug. 27, 2015, issued in connection with U.S. Appl. No. 13/705,177, filed Dec. 5, 2012, 34 pages.

Notice of Allowance dated Aug. 27, 2015, issued in connection with U.S. Appl. No. 14/505,027, filed Oct. 2, 2014, 18 pages.

Notice of Allowance dated Dec. 27, 2011, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 15 pages.

Notice of Allowance dated Oct. 27, 2015, issued in connection with U.S. Appl. No. 14/299,847, filed Jun. 9, 2014, 5 pages.

Notice of Allowance dated Oct. 28, 2014, issued in connection with U.S. Appl. No. 13/896,037, filed May 16, 2013, 7 pages.

Notice of Allowance dated Jul. 29, 2015, issued in connection with U.S. Appl. No. 13/359,976, filed Jan. 27, 2012, 28 pages.

Notice of Allowance dated Jul. 29, 2015, issued in connection with U.S. Appl. No. 14/186,850, filed Feb. 21, 2014, 9 pages.

Notice of Allowance dated Aug. 30, 2016, issued in connection with U.S. Appl. No. 14/290,493, filed May 29, 2014, 7 pages.

Notice of Allowance dated Jul. 30, 2015, issued in connection with U.S. Appl. No. 13/705,178, filed Dec. 5, 2012, 18 pages.

Notice of Allowance dated May 30, 2019, issued in connection with U.S. Appl. No. 16/129,758, filed Sep. 12, 2018, 7 pages.

Notice of Allowance dated Aug. 5, 2015, issued in connection with U.S. Appl. No. 13/435,776, filed Mar. 30, 2012, 26 pages.

Notice of Allowance dated Jul. 6, 2015, issued in connection with U.S. Appl. No. 13/297,000, filed Nov. 15, 2011, 24 pages.

Notice of Allowance dated Apr. 7, 2017, issued in connection with U.S. Appl. No. 14/629,937, filed Feb. 24, 2015, 8 pages.

Notice of Allowance dated Dec. 7, 2018, issued in connection with U.S. Appl. No. 15/228,812, filed Aug. 4, 2016, 7 pages.

Notice of Incomplete Re-Exam Request dated May 25, 2017, issued in connection with U.S. Appl. No. 90/013,959, filed Apr. 1, 2016, 10 pages.

Notice of Intent to Issue Re-Examination Certificate dated Mar. 24, 2017, issued in connection with U.S. Appl. No. 90/013,859, filed Nov. 4, 2016, 10 pages.

Nutzal et al., "Sharing Systems for Future HiFi Systems," IEEE, 2004, 9 pages.

Office Action in Ex Parte Reexamination dated Oct. 20, 2017, issued in connection with Reexamination U.S. Appl. No. 90/013,959, filed Jun. 16, 2017, 50 pages.

Palm, Inc., "Handbook for the Palm VII Handheld," May 2000, 311 pages.

Parasound Zpre2 Zone Preamplifier with PTZI Remote Control, 2005, 16 pages.

Park et al., "Group Synchronization in MultiCast Media Communications," Proceedings of the 5th Research on Multicast Technology Workshop, 2003, 5 pages.

Pillai et al., "A Method to Improve the Robustness of MPEG Video Applications over Wireless Networks," Kent Ridge Digital Labs, 2000, 15 pages.

Polycom Conference Composer User Guide, copyright 2001, 29 pages.

Postel, J., "User Datagram Protocol," RFC: 768, USC/Information Sciences Institute, Aug. 1980, 3 pages.

Preinterview First Office Action dated Jun. 8, 2016, issued in connection with U.S. Appl. No. 14/619,813, filed Feb. 11, 2015, 4 pages.

Pre-Interview First Office Action dated Mar. 10, 2015, issued in connection with U.S. Appl. No. 14/505,027, filed Oct. 2, 2014, 4 pages.

Presentations at WinHEC 2000, May 2000, 138 pages.

PRISMIQ, Inc., "PRISMIQ Media Player User Guide," 2003, 44 pages.

Proficient Audio Systems M6 Quick Start Guide, 2011, 5 pages.

Proficient Audio Systems: Proficient Editor Advanced Programming Guide, 2007, 40 pages.

Programming Interface for WL54040 Dual-Band Wireless Transceiver, AVAGO0066, Agere Systems, May 2004, 16 pages.

Radio Shack, "Auto-Sensing 4-Way Audio/Video Selector Switch," 2004, 1 page.

RadioShack, Pro-2053 Scanner, 2002 Catalog, part 1, 100 pages.

RadioShack, Pro-2053 Scanner, 2002 Catalog, part 2, 100 pages.

RadioShack, Pro-2053 Scanner, 2002 Catalog, part 3, 100 pages.

RadioShack, Pro-2053 Scanner, 2002 Catalog, part 4, 100 pages.

RadioShack, Pro-2053 Scanner, 2002 Catalog, part 5, 46 pages.

Rane: DragNet software; available for sale at least 2006.

Rangan et al., "Feedback Techniques for Continuity and Synchronization in Multimedia Information Retrieval," ACM Transactions on Information Systems, 1995, pp. 145-176, vol. 13, No. 2.

Real Time Control Protocol (RTCP) and Realtime Transfer Protocol (RTP), RFC 1889 (Jan. 1996) (D+M_0397810-84) (75 pages).

Realtime Streaming Protocol (RTSP), RFC 2326 (Apr. 1998) (D+M_0397945-8036) (92 pages).

Realtime Transport Protocol (RTP), RFC 3550 (Jul. 2003) (D+M_0398235-323) (89 pages).

Re-Exam Final Office Action dated Aug. 5, 2015, issued in connection with U.S. Appl. No. 90/013,423, filed Jan. 5, 2015, 25 pages.

Reexam Non-Final Office Action dated Oct. 17, 2016, issued in connection with U.S. Appl. No. 90/013,756, filed May 25, 2016, 31 pages.

Re-Exam Non-Final Office Action dated Apr. 22, 2015, issued in connection with U.S. Appl. No. 90/013,423, filed Jan. 5, 2015, 16 pages.

Levergood et al., "AudioFile: A Network-Transparent System for Distributed Audio Applications," Digital Equipment Corporation, 1993, 109 pages.

LG: RJP-201M Remote Jack Pack Installation and Setup Guide, 2010, 24 pages.

Lienhart et al., "On the Importance of Exact Synchronization for Distributed Audio Signal Processing," Session L: Poster Session II—ICASSP'03 Papers, 2002, 1 page.

LinkSys by Cisco, Wireless Home Audio Controller, Wireless-N Touchscreen Remote DMRW1000 Datasheet, Copyright 2008, 2 pages.

LinkSys by Cisco, Wireless Home Audio Controller, Wireless-N Touchscreen Remote DMRW1000 User Guide, Copyright 2008, 64 pages.

LinkSys by Cisco, Wireless Home Audio Player, Wireless-N Music Extender DMP100 Quick Installation Guide, Copyright 2009, 32 pages.

LinkSys by Cisco, Wireless Home Audio Player, Wireless-N Music Extender DMP100 User Guide, Copyright 2008, 65 pages.

Linux SDK for UPnP Devices v. 1.2 (Sep. 6, 2002) (101 pages).

Liu et al., "A synchronization control scheme for real-time streaming multimedia applications," Packet Video, 2003, 10 pages, vol. 2003.

Liu et al., "Adaptive Delay Concealment for Internet Voice Applications with Packet-Based Time-Scale Modification," Information Technologies 2000, pp. 91-102.

Louderback, Jim, "Affordable Audio Receiver Furnishes Homes With MP3," TechTV Vault. Jun. 28, 2000 retrieved Jul. 10, 2014, 2 pages.

Machine Translation of JP2004-193868A Wireless Transmission and Reception System and Wireless Transmission and Reception Method, 2 pages.

Machine Translation of JP2007-2888405A Video Sound Output System, Video Sound Processing Method, and Program, 64 pages.

Maniactools, "Identify Duplicate Files by Sound," Sep. 28, 2010, <http://www.maniactools.com/soft/music-duplicate-remover/identify-duplicate-files-by-sound.shtml>.

MediaRenderer:1 Device Template Version 1.01 for UPnP, Version 1.0 (Jun. 25, 2002) (12 pages).

MediaServer:1 Device Template Version 1.01 for UPnP, Version 1.0 (Jun. 25, 2002) (12 pages).

Microsoft, Universal Plug and Play (UPnP) Client Support ("Microsoft UPnP") (Aug. 2001) (D+M_0402007-24) (18 pages).

Microsoft Window's XP Reviewer's Guide (Aug. 2001) (D+M_0402225-85) (61 pages).

US 10,469,966 B2

Page 13

(56)

References Cited

OTHER PUBLICATIONS

"Microsoft Windows XP File and Printer Share with Microsoft Windows" Microsoft Windows XP Technical Article, 2003, 65 pages.

Mills David L., "Network Time Protocol (Version 3) Specification, Implementation and Analysis," Network Working Group, Mar. 1992, 7 pages.

Mills, David L., "Precision Synchronization of Computer Network Clocks," ACM SIGCOMM Computer Communication Review, 1994, pp. 28-43, vol. 24, No. 2.

"Model MRC44 Four Zone—Four Source Audio/Video Controller/Amplifier System," Xantech Corporation, 2002, 52 pages.

Motorola, "Simplefi, Wireless Digital Audio Receiver, Installation and User Guide," Dec. 31, 2001, 111 pages.

"SMPTE Made Simple: A Time Code Tutor by Timeline," 1996, 46 pages.

Network Time Protocol (NTP), RFC 1305 (Mar. 1992) (D+M_0397417-536) (120 pages).

"NexSys Software v.3 Manual," Crest Audio, Inc., 1997, 76 pages.

Niederst, Jennifer "O'Reilly Web Design in a Nutshell," Second Edition, Sep. 2001, 678 pages.

Nilsson, M., "ID3 Tag Version 2," Mar. 26, 1998, 28 pages.

Non-Final Office Action dated May 1, 2014, issued in connection with U.S. Appl. No. 14/184,522, filed Feb. 19, 2014, 31 pages.

Non-Final Office Action dated Dec. 5, 2013, issued in connection with U.S. Appl. No. 13/827,653, filed Mar. 14, 2013, 28 pages.

Non-Final Office Action dated Jan. 5, 2012, issued in connection with U.S. Appl. No. 13/298,090, filed Nov. 16, 2011, 40 pages.

Non-Final Office Action dated May 6, 2014, issued in connection with U.S. Appl. No. 13/705,176, filed Dec. 5, 2012, 23 pages.

Non-Final Office Action dated Jan. 7, 2014, issued in connection with U.S. Appl. No. 13/896,829, filed May 17, 2013, 11 pages.

Non-Final Office Action dated Sep. 7, 2016, issued in connection with U.S. Appl. No. 13/864,248, filed Apr. 17, 2013, 12 pages.

Non-final Office Action dated Apr. 10, 2013, issued in connection with U.S. Appl. No. 13/619,237, filed Sep. 14, 2012, 10 pages.

Non-Final Office Action dated Feb. 10, 2014, issued in connection with U.S. Appl. No. 13/083,499, filed Apr. 8, 2011, 12 pages.

Non-Final Office Action dated May 12, 2014, issued in connection with U.S. Appl. No. 14/184,528, filed Feb. 19, 2014, 23 pages.

Non-Final Office Action dated May 14, 2014, issued in connection with U.S. Appl. No. 13/848,932, filed Mar. 22, 2013, 14 pages.

Non-Final Office Action dated Jun. 17, 2014, issued in connection with U.S. Appl. No. 14/176,808, filed Feb. 10, 2014, 6 pages.

Non-Final Office Action dated Dec. 18, 2013, issued in connection with U.S. Appl. No. 13/907,666, filed May 31, 2013, 12 pages.

Non-Final Office Action dated Jan. 18, 2008, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 38 pages.

Non-Final Office Action dated Apr. 19, 2010, issued in connection with U.S. Appl. No. 11/801,468, filed May 9, 2007, 16 pages.

Non-Final Office Action dated Mar. 19, 2013, issued in connection with U.S. Appl. No. 13/724,048, filed Dec. 21, 2012, 9 pages.

Non-Final Office Action dated Jun. 21, 2011, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 13 pages.

Non-Final Office Action dated Jan. 22, 2009, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 18 pages.

Non-Final Office Action dated Jul. 23, 2014, issued in connection with U.S. Appl. No. 14/256,434, filed Apr. 18, 2014, 12 pages.

Non-Final Office Action dated Jul. 25, 2014, issued in connection with U.S. Appl. No. 14/184,526, filed Feb. 19, 2014, 9 pages.

Non-Final Office Action dated Jul. 25, 2014, issued in connection with U.S. Appl. No. 14/184,935, filed Feb. 20, 2014, 11 pages.

Non-Final Office Action dated Jun. 25, 2010, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 17 pages.

Non-Final Office Action dated Nov. 25, 2013, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 19 pages.

Notice of Allowance dated Jul. 2, 2015, issued in connection with U.S. Appl. No. 14/184,935, filed Feb. 20, 2014, 23 pages.

Notice of Allowance dated Jun. 2, 2014, issued in connection with U.S. Appl. No. 13/083,499, filed Apr. 8, 2011, 5 pages.

Notice of Allowance dated Sep. 3, 2015, issued in connection with U.S. Appl. No. 13/705,174, filed Dec. 5, 2012, 4 pages.

Notice of Allowance dated Aug. 4, 2015, issued in connection with U.S. Appl. No. 14/516,867, filed Oct. 17, 2014, 13 pages.

Notice of Allowance dated Dec. 5, 2014, issued in connection with U.S. Appl. No. 14/256,434, filed Apr. 18, 2014, 7 pages.

Notice of Allowance dated Oct. 5, 2012, issued in connection with U.S. Appl. No. 13/204,511, filed Aug. 5, 2011, 11 pages.

Notice of Allowance dated Mar. 6, 2014, issued in connection with U.S. Appl. No. 13/827,653, filed Mar. 14, 2013, 17 pages.

Notice of Allowance dated May 6, 2011, issued in connection with U.S. Appl. No. 11/801,468, filed May 9, 2007, 10 pages.

Notice of Allowance dated Sep. 6, 2013, issued in connection with U.S. Appl. No. 13/619,237, filed Sep. 14, 2012, 10 pages.

Notice of Allowance dated Sep. 6, 2016, issued in connection with U.S. Appl. No. 15/134,767, filed Apr. 21, 2016, 7 pages.

Notice of Allowance dated Apr. 7, 2016, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 40 pages.

Notice of Allowance dated Oct. 7, 2015, issued in connection with U.S. Appl. No. 14/184,526, filed Feb. 19, 2014, 7 pages.

Notice of Allowance dated Oct. 9, 2015, issued in connection with U.S. Appl. No. 13/435,739, filed Mar. 30, 2012, 4 pages.

Notice of Allowance dated Sep. 9, 2016, issued in connection with U.S. Appl. No. 15/134,761, filed Apr. 21, 2016, 7 pages.

Notice of Allowance dated Mar. 1, 2018, issued in connection with U.S. Appl. No. 14/619,813, filed Feb. 11, 2015, 7 pages.

Notice of Allowance dated Aug. 10, 2015, issued in connection with U.S. Appl. No. 13/848,904, filed Mar. 22, 2013, 9 pages.

Notice of Allowance dated Jul. 10, 2015, issued in connection with U.S. Appl. No. 13/013,740, filed Jan. 25, 2011, 7 pages.

Notice of Allowance dated Jun. 10, 2019, issued in connection with U.S. Appl. No. 16/128,443, filed Sep. 11, 2018, 10 pages.

Notice of Allowance dated Mar. 10, 2016, issued in connection with U.S. Appl. No. 14/937,523, filed Nov. 10, 2015, 5 pages.

Notice of Allowance dated Nov. 10, 2011, issued in connection with U.S. Appl. No. 11/906,702, filed Oct. 2, 2007, 17 pages.

Notice of Allowance dated Sep. 10, 2014, issued in connection with U.S. Appl. No. 13/892,230, filed May 10, 2013, 5 pages.

Notice of Allowance dated Sep. 10, 2018, issued in connection with U.S. Appl. No. 14/629,937, filed Feb. 24, 2015, 7 pages.

Notice of Allowance dated Apr. 11, 2016, issued in connection with U.S. Appl. No. 13/864,247, filed Apr. 17, 2013, 21 pages.

Notice of Allowance dated Jan. 11, 2016, issued in connection with U.S. Appl. No. 14/564,544, filed Dec. 9, 2014, 5 pages.

Notice of Allowance dated Jul. 11, 2017, issued in connection with U.S. Appl. No. 14/825,961, filed Aug. 13, 2015, 5 pages.

Notice of Allowance dated Aug. 12, 2015, issued in connection with U.S. Appl. No. 13/435,739, filed Mar. 30, 2012, 27 pages.

Notice of Allowance dated Jun. 12, 2014, issued in connection with U.S. Appl. No. 13/896,829, filed May 17, 2013, 5 pages.

Notice of Allowance dated Jul. 13, 2015, issued in connection with U.S. Appl. No. 14/184,526, filed Feb. 19, 2014, 22 pages.

Notice of Allowance dated May 13, 2015, issued in connection with U.S. Appl. No. 14/299,847, filed Jun. 9, 2014, 10 pages.

Notice of Allowance dated Nov. 13, 2013, issued in connection with U.S. Appl. No. 13/724,048, filed Dec. 21, 2012, 7 pages.

Notice of Allowance dated Nov. 13, 2017, issued in connection with U.S. Appl. No. 14/563,515, filed Dec. 8, 2014, 11 pages.

Notice of Allowance dated Oct. 13, 2015, issued in connection with U.S. Appl. No. 13/864,251, filed Apr. 17, 2013, 7 pages.

Notice of Allowance dated Jun. 14, 2012, issued in connection with U.S. Appl. No. 12/035,112, filed Feb. 21, 2008, 9 pages.

Notice of Allowance dated Jan. 15, 2019, issued in connection with U.S. Appl. No. 15/487,686, filed Apr. 14, 2017, 8 pages.

Notice of Allowance dated Jul. 15, 2015, issued in connection with U.S. Appl. No. 13/705,174, filed Dec. 5, 2012, 18 pages.

Notice of Allowance dated Mar. 15, 2016, issued in connection with U.S. Appl. No. 14/937,571, filed Nov. 10, 2015, 5 pages.

Notice of Allowance dated Jun. 16, 2009, issued in connection with U.S. Appl. No. 10/861,653, filed Jun. 5, 2004, 11 pages.

Notice of Allowance dated May 16, 2017, issued in connection with U.S. Appl. No. 15/228,685, filed Aug. 4, 2016, 10 pages.

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(56)

References Cited

OTHER PUBLICATIONS

Notice of Allowance dated Jul. 17, 2015, issued in connection with U.S. Appl. No. 13/864,251, filed Apr. 17, 2013, 20 pages.

Notice of Allowance dated Aug. 19, 2016, issued in connection with U.S. Appl. No. 14/619,813, filed Feb. 11, 2015, 9 pages.

Notice of Allowance dated May 19, 2015, issued in connection with U.S. Appl. No. 13/907,666, filed May 31, 2013, 7 pages.

Notice of Allowance dated Oct. 19, 2016, issued in connection with U.S. Appl. No. 14/290,493, filed May 29, 2014, 14 pages.

Notice of Allowance dated Jan. 20, 2016, issued in connection with U.S. Appl. No. 14/465,457, filed Aug. 21, 2014, 10 pages.

Notice of Allowance dated Oct. 21, 2015, issued in connection with U.S. Appl. No. 14/174,244, filed Feb. 6, 2014, 5 pages.

Notice of Allowance dated Oct. 21, 2015, issued in connection with U.S. Appl. No. 14/174,253, filed Feb. 6, 2014, 6 pages.

Notice of Allowance dated Sep. 21, 2015, issued in connection with U.S. Appl. No. 13/297,000, filed Nov. 15, 2011, 11 pages.

Notice of Allowance dated Jan. 22, 2015, issued in connection with U.S. Appl. No. 13/630,565, filed Sep. 28, 2012, 7 pages.

Notice of Allowance dated Sep. 22, 2015, issued in connection with U.S. Appl. No. 13/888,203, filed May 6, 2013, 7 pages.

Notice of Allowance dated May 24, 2017, issued in connection with U.S. Appl. No. 14/806,070, filed Jul. 22, 2015, 5 pages.

Notice of Allowance dated Oct. 24, 2016, issued in connection with U.S. Appl. No. 15/134,761, filed Apr. 21, 2016, 7 pages.

Hans et al., "Interacting with Audio Streams for Entertainment and Communication," Proceedings of the Eleventh ACM International Conference on Multimedia, ACM, 2003, 7 pages.

Herre et al., "The Reference Model Architecture for MPEG Spatial Audio Coding," Audio Engineering Society Convention Paper (Presented at the 118th Convention), May 28-31, 2005, 13 pages.

Home Networking with Universal Plug and Play, IEEE Communications Magazine, vol. 39 No. 12 (Dec. 2001) (D+M_0402025-40) (16 pages).

"Home Theater Control Systems," Cinema Source, 2002, 19 pages.

Horwitz, Jeremy, "Logic3 i-Station25," retrieved from the internet: <http://www.ilounge.com/index.php/reviews/entry/logic3-i-station25/>, last visited Dec. 17, 2013, 5 pages.

Huang C.M., et al., "A Synchronization Infrastructure for Multicast Multimedia at the Presentation Layer," IEEE Transactions on Consumer Electronics, 1997, pp. 370-380, vol. 43, No. 3.

IBM Home Director Installation and Service Manual, Copyright 1998, 124 pages.

IBM Home Director Owner's Manual, Copyright 1999, 67 pages.

ID3 tag version 2.4.0—Native Frames, Draft Specification, copyright 2000, 41 pages.

Implicit, LLC v. Sonos, Inc., Defendant's Original Complaint (Mar. 3, 2017) (15 pages).

Integra Audio Network Receiver NAC 2.3 Instruction Manual, 68 pages.

Integra Audio Network Server NAS 2.3 Instruction Manual, pp. 1-32.

Integra Service Manual, Audio Network Receiver Model NAC-2.3, Dec. 2002, 44 pages.

Intel Designing a UPnP AV Media Renderer, v. 1.0 ("Intel AV Media Renderer") (May 20, 2003) (SONDM000115117-62) (46 pages).

Intel Media Renderer Device Interface ("Intel Media Renderer") (Sep. 6, 2002) (62 pages).

Intel SDK for UPnP Devices Programming Guide, Version 1.2.1, (Nov. 2002) (30 pages).

International Bureau, International Preliminary Report on Patentability dated Jan. 8, 2015, issued in connection with International Application No. PCT/US2013/046372, filed on Jun. 18, 2013, 6 pages.

International Bureau, International Preliminary Report on Patentability, dated Jan. 8, 2015, issued in connection with International Application No. PCT/US2013/046386, filed on Jun. 18, 2013, 8 pages.

International Bureau, International Preliminary Report on Patentability, dated Oct. 17, 2013, issued in connection with International Application No. PCT/IB2012/052071, filed on Apr. 26, 2012, 7 pages.

International Bureau, International Preliminary Report on Patentability dated Jan. 30, 2014, issued in connection with International Application No. PCT/US2012/045894, filed on Jul. 9, 2012, 6 pages.

International Searching Authority, International Search Report dated Aug. 1, 2008, in connection with International Application No. PCT/US2004/023102, 5 pages.

International Searching Authority, International Search Report dated Aug. 23, 2012, issued in connection with International Application No. PCT/IB2012/052071, filed on Apr. 26, 2012, 3 pages.

International Searching Authority, International Search Report dated Aug. 26, 2013, issued in connection with International Application No. PCT/US2013/046372, filed on Jun. 18, 2013, 3 pages.

International Searching Authority, International Search Report dated Dec. 26, 2012, issued in connection with International Application No. PCT/US2012/045894, filed on Jul. 9, 2012, 3 pages.

International Searching Authority, International Search Report dated Sep. 30, 2013, issued in connection with International Application No. PCT/US2013/046386, filed on Jun. 18, 2013, 3 pages.

International Searching Authority, Written Opinion dated Aug. 23, 2012, issued in connection with International Application No. PCT/IB2012/052071, filed on Apr. 26, 2012, 6 pages.

International Searching Authority, Written Opinion dated Aug. 26, 2013, issued in connection with International Application No. PCT/US2013/046372, filed on Jun. 18, 2013, 4 pages.

International Searching Authority, Written Opinion dated Dec. 26, 2012, issued in connection with International Application No. PCT/US2012/045894, filed on Jul. 9, 2012, 4 pages.

International Searching Authority, Written Opinion dated Sep. 30, 2013, issued in connection with International Application No. PCT/US2013/046386, filed on Jun. 18, 2013, 6 pages.

Ishibashi et al., "A Comparison of Media Synchronization Quality Among Reactive Control Schemes," IEEE Infocom, 2001, pp. 77-84.

Ishibashi et al., "A Group Synchronization Mechanism for Live Media in Multicast Communications," IEEE Global Telecommunications Conference, 1997, pp. 746-752, vol. 2.

Ishibashi et al., "A Group Synchronization Mechanism for Stored Media in Multicast Communications," IEEE Information Revolution and Communications, 1997, pp. 692-700, vol. 2.

Issues with Mixed IEEE 802.b/802.11g Networks, AVAGO0058, Agere Systems, Feb. 2004, 5 pages.

Japanese Patent Office, Decision of Rejection dated Jul. 8, 2014, issued in connection with Japanese Patent Application No. 2012-178711, 3 pages.

Japanese Patent Office, Final Office Action dated Jun. 4, 2019, issued in connection with Japanese Patent Application No. 2017-211958, 8 pages.

Japanese Patent Office, Notice of Rejection, dated Feb. 3, 2015, issued in connection with Japanese Patent Application No. 2014-521648, 7 pages.

Japanese Patent Office, Notice of Rejection dated Sep. 15, 2015, issued in connection with Japanese Patent Application No. 2014-220704, 7 pages.

Japanese Patent Office, Office Action dated Nov. 1, 2016, issued in connection with Japanese Application No. 2015-238682, 7 pages.

Japanese Patent Office, Office Action dated Jan. 6, 2015, issued in connection with Japanese Patent Application No. 2014-503273, 5 pages.

Japanese Patent Office, Office Action Dec. 18, 2018, issued in connection with Japanese Application No. 2017-211958, 8 pages.

Japanese Patent Office, Office Action dated May 24, 2016, issued in connection with Japanese Patent Application No. 2014-220704, 7 pages.

Japanese Patent Office, Office Action dated Mar. 29, 2016, issued in connection with Japanese Patent Application No. JP2015-520288, 12 pages.

US 10,469,966 B2

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(56)

References Cited

OTHER PUBLICATIONS

Japanese Patent Office, Office Action Summary dated Feb. 2, 2016, issued in connection with Japanese Patent Application No. 2015-520286, 6 pages.

Japanese Patent Office, Office Action Summary dated Sep. 8, 2015, issued in connection with Japanese Patent Application No. 2014-503273, 4 pages.

Japanese Patent Office, Office Action Summary dated Nov. 2013, issued in connection with Japanese Patent Application No. 2012-178711, 5 pages.

Japanese Patent Office, Translation of Office Action dated Dec. 18, 2018, issued in connection with Japanese Application No. 2017-211958, 6 pages.

Jo et al., "Synchronized One-to-many Media Streaming with Adaptive Playout Control," Proceedings of SPIE, 2002, pp. 71-82, vol. 4861.

Jones, Stephen, "Dell Digital Audio Receiver: Digital upgrade for your analog stereo," Analog Stereo, Jun. 24, 2000 retrieved Jun. 18, 2014, 2 pages.

Kou et al., "RenderingControl:1 Service Template Verion 1.01," Contributing Members of the UPnP Forum, Jun. 25, 2002, 63 pages.

Lake Processors: Lake® LM Series Digital Audio Processors Operation Manual, 2011, 71 pages.

Reid, Mark, "Multimedia conferencing over ISDN and IP networks using ITU-T H-series recommendations: architecture, control and coordination," Computer Networks, 1999, pp. 225-235, vol. 31.

RenderingControl:1 Service Template Version 1.01 for UPnP, Version 1.0, (Jun. 25, 2002) (SONDM000115187-249) (63 pages).

Renewed Request for Ex Parte Re-Examination, U.S. Appl. No. 90/013,959 filed Jun. 16, 2017, 126 pages.

Renkus Heinz Manual; available for sale at least 2004, 6 pages.

Request for Ex Parte Reexamination submitted in U.S. Pat. No. 9,213,357 on May 22, 2017, 85 pages.

"Residential Distributed Audio Wiring Practices," Leviton Network Solutions, 2001, 13 pages.

Ritchie et al., "MediaServer:1 Device Template Version 1.01," Contributing Members of the UPnP Forum, Jun. 25, 2002, 12 pages.

Ritchie et al., "UPnP AV Architecture:1, Version 1.0," Contributing Members of the UPnP Forum, Jun. 25, 2002, 22 pages.

Ritchie, John, "MediaRenderer:1 Device Template Version 1.01," Contributing Members of the UPnP Forum, Jun. 25, 2002, 12 pages.

Roland Corporation, "Roland announces BA-55 Portable PA System," press release, Apr. 6, 2011, 2 pages.

Rothermel et al., "An Adaptive Protocol for Synchronizing Media Streams," Institute of Parallel and Distributed High-Performance Systems (IPVR), 1997, 26 pages.

Rothermel et al., "An Adaptive Stream Synchronization Protocol," 5th International Workshop on Network and Operating System Support for Digital Audio and Video, 1995, 13 pages.

Rothermel et al., "An Adaptive Stream Synchronization Protocol," 5th International Workshop on Network and Operating System Support for Digital Audio and Video, Apr. 18-21, 1995, 12 pages.

Rothermel et al., "Clock Hierarchies—An Abstraction for Grouping and Controlling Media Streams," University of Stuttgart Institute of Parallel and Distributed High-Performance Systems, Jan. 1996, 23 pages.

Rothermel et al., "Synchronization in Joint-Viewing Environments," University of Stuttgart Institute of Parallel and Distributed High-Performance Systems, 1992, 13 pages.

Rothermel, Kurt, "State-of-the-Art and Future Research in Stream Synchronization," University of Stuttgart, 3 pages.

"RVL-6 Modular Multi-Room Controller, Installation & Operation Guide," Nile Audio Corporations, 1999, 46 pages.

Schmandt et al., "Impromptu: Managing Networked Audio Applications for Mobile Users," 2004, 11 pages.

Schulzrinne et al., "RTP: A Transport Protocol for Real-Time Applications," Network Working Group, RFC: 3550, Standards Track, Jul. 2003, 104 pages.

Schulzrinne H., et al., "RTP: A Transport Protocol for Real-Time Applications, RFC 3550," Network Working Group, 2003, pp. 1-89.

Simple Network Time Protocol (SNTP), RFC 1361 (Aug. 1992) (D+M_0397537-46) (10 pages).

Simple Network Time Protocol (SNTP), RFC 1769 (Mar. 1995) (D+M_0397663-76) (14 pages).

Simple Service Discovery Protocol/1.0 Operating without an Arbiter (Oct. 28, 1999) (24 pages).

Sonos Controller for iPad Product Guide; copyright 2004-2013; 47 pages.

Sonos Digital Music System User Guide, Version: 050801, Aug. 2005, 114 pages.

Sonos, Inc. v D&M Holdings, D&M Supp Opposition Brief including Exhibits, Mar. 17, 2017, 23 pages.

Sonos, Inc. v. D&M Holdings, Expert Report of Jay P. Kesan including Appendices A-P, Feb. 20, 2017, 776 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Complaint for Patent Infringement, filed Oct. 21, 2014, 20 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidity Contentions, filed Sep. 14, 2016, 100 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidity Contentions, filed Apr. 15, 2016, 97 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Preliminary Identification of Indefinite Terms, provided Jul. 29, 2016, 8 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendants' 35 U.S.C. § 282 Notice filed Nov. 2, 2017, 31 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Answer, Defenses, and Counterclaims for Patent Infringement, filed Nov. 30, 2015, 47 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendants' Answer to Plaintiff's Second Amended Complaint, filed Apr. 30, 2015, 19 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendants' First Amended Answer to Plaintiff's Third Amended Complaint, filed Sep. 7, 2016, 23 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendants' Reply in Support of Partial Motion for Judgement on the Pleadings, filed Jun. 10, 2016, 15 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Exhibit A: Defendants' First Amended Answer to Plaintiffs' Third Amended Complaint, provided Aug. 1, 2016, 26 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Exhibit A: Defendants' Second Amended Answer to Plaintiffs' Third Amended Complaint, filed Sep. 9, 2016, 43 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Exhibit A: Defendants' Second Amended Answer to Plaintiffs' Third Amended Complaint, provided Sep. 9, 2016, 88 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., First Amended Complaint for Patent Infringement, filed Dec. 17, 2014, 26 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Joint Claim Construction Chart, vol. 1 of 3 with Exhibits A-O, filed Aug. 17, 2016, 30 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Opening Brief in Support of Defendants' Partial Motion for Judgement on the Pleadings for Lack of Patent-Eligible Subject Matter, filed May 6, 2016, 27 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Plaintiff Sonos, Inc.'s Opening Claim Construction Brief, filed Sep. 9, 2016, 26 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Plaintiff Sonos, Inc.'s Response in Opposition to Defendants' Partial Motion for Judgment on the Pleadings, filed May 27, 2016, 24 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Reply Brief in Support of Defendants' Motion for Leave to Amend their Answer to Add the Defense of Inequitable Conduct, provided Nov. 10, 2016, 16 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Reply Brief in Support of Defendants' Motion for Leave to Amend their Answer to Add the Defense of Inequitable Conduct, provided Sep. 9, 2016, 16 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Second Amended Complaint for Patent Infringement, filed Feb. 27, 2015, 49 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Sonos's Motion to Strike Defendants' New Amended Answer Submitted with their Reply Brief, provided Sep. 15, 2016, 10 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Sonos's Opposition to Defendants' Motion for Leave to Amend their Answer to Add the Defense of Inequitable Conduct, provided Oct. 31, 2016, 26 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Third Amended Complaint for Patent Infringement, filed Jan. 29, 2016, 47 pages.

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(56)

References Cited**OTHER PUBLICATIONS**

Final Office Action dated Mar. 27, 2014, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 29 pages.

Final Office Action dated Jan. 28, 2011, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 21 pages.

Final Office Action dated Jun. 30, 2008, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 30 pages.

Final Office Action dated Jul. 1, 2016, issued in connection with U.S. Appl. No. 13/458,558, filed Apr. 27, 2012, 11 pages.

Final Office Action dated Jul. 2, 2015, issued in connection with U.S. Appl. No. 13/458,558, filed Apr. 27, 2012, 11 pages.

Final Office Action dated Aug. 3, 2015, issued in connection with U.S. Appl. No. 13/848,921, filed Mar. 22, 2013, 13 pages.

Final Office Action dated Dec. 3, 2014, issued in connection with U.S. Appl. No. 14/184,528, filed Feb. 19, 2014, 12 pages.

Final Office Action dated Jul. 3, 2012, issued in connection with U.S. Appl. No. 13/298,090, filed Nov. 16, 2011, 46 pages.

Final Office Action dated Jun. 3, 2016, issued in connection with U.S. Appl. No. 13/705,176, filed Dec. 5, 2012, 24 pages.

Final Office Action dated Mar. 3, 2015, issued in connection with U.S. Appl. No. 13/864,251, filed Apr. 17, 2013, 13 pages.

Final Office Action dated Mar. 4, 2015, issued in connection with U.S. Appl. No. 13/848,904, filed Mar. 22, 2013, 16 pages.

Final Office Action dated Mar. 5, 2015, issued in connection with U.S. Appl. No. 13/888,203, filed May 6, 2013, 13 pages.

Final Office Action dated Jan. 7, 2017, issued in connection with U.S. Appl. No. 13/848,932, filed Mar. 22, 2013, 14 pages.

Final Office Action dated Mar. 9, 2015, issued in connection with U.S. Appl. No. 14/516,867, filed Oct. 17, 2014, 14 pages.

Final Office Action dated Aug. 10, 2015, issued in connection with U.S. Appl. No. 14/290,493, filed May 29, 2014, 26 pages.

Final Office Action dated Feb. 10, 2014, issued in connection with U.S. Appl. No. 13/013,740, filed Jan. 25, 2011, 13 pages.

Final Office Action dated Aug. 11, 2015, issued in connection with U.S. Appl. No. 13/864,247, filed Apr. 17, 2013, 15 pages.

Final Office Action dated Feb. 11, 2015, issued in connection with U.S. Appl. No. 14/184,526, filed Feb. 19, 2014, 13 pages.

Final Office Action dated Feb. 11, 2015, issued in connection with U.S. Appl. No. 14/184,935, filed Feb. 20, 2014, 17 pages.

Final Office Action dated Feb. 12, 2015, issued in connection with U.S. Appl. No. 14/184,522, filed Feb. 17, 2014, 20 pages.

Final Office Action dated Apr. 13, 2017, issued in connection with U.S. Appl. No. 14/563,515, filed Dec. 8, 2014, 13 pages.

Final Office Action dated Dec. 13, 2016, issued in connection with U.S. Appl. No. 14/629,937, filed Feb. 24, 2015, 14 pages.

Final Office Action dated Oct. 13, 2011, issued in connection with U.S. Appl. No. 11/853,790, filed Sep. 11, 2007, 10 pages.

Final Office Action dated Oct. 13, 2011, issued in connection with U.S. Appl. No. 12/035,112, filed Feb. 21, 2008, 10 pages.

Final Office Action dated Nov. 14, 2018, issued in connection with U.S. Appl. No. 15/130,919, filed Apr. 15, 2016, 12 pages.

Final Office Action dated Jul. 15, 2015, issued in connection with U.S. Appl. No. 14/504,812, filed Oct. 2, 2014, 18 pages.

Final Office Action dated Jun. 15, 2015, issued in connection with U.S. Appl. No. 14/184,522, filed Feb. 19, 2014, 25 pages.

Final Office Action dated Dec. 17, 2014, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 36 pages.

Final Office Action dated Oct. 19, 2016, issued in connection with U.S. Appl. No. 13/848,921, filed Mar. 22, 2013, 14 pages.

Final Office Action dated Jan. 21, 2010, issued in connection with U.S. Appl. No. 11/906,702, filed Oct. 2, 2007, 27 pages.

Final Office Action dated Oct. 22, 2014, issued in connection with U.S. Appl. No. 14/186,850, filed Feb. 21, 2014, 12 pages.

Final Office Action dated Oct. 23, 2014, issued in connection with U.S. Appl. No. 13/705,176, filed Dec. 5, 2012, 23 pages.

Final Office Action dated Feb. 24, 2016, issued in connection with U.S. Appl. No. 13/871,795, filed Apr. 26, 2013, 28 pages.

Final Office Action dated May 25, 2016, issued in connection with U.S. Appl. No. 14/290,493, filed May 29, 2014, 33 pages.

Final Office Action dated Apr. 28, 2015, issued in connection with U.S. Appl. No. 14/186,850, filed Feb. 21, 2014, 20 pages.

Final Office Action dated Jun. 29, 2015, issued in connection with U.S. Appl. No. 14/465,457, filed Aug. 21, 2014, 13 pages.

Final Office Action dated Jan. 3, 2019, issued in connection with U.S. Appl. No. 15/405,931, filed Jan. 13, 2017, 16 pages.

Final Office Action dated Nov. 30, 2015, issued in connection with U.S. Appl. No. 13/871,795, filed Apr. 26, 2013, 26 pages.

Final Office Action dated Apr. 6, 2017, issued in connection with U.S. Appl. No. 14/620,937, filed Feb. 12, 2015, 15 pages.

Final Office Action dated Dec. 7, 2017, issued in connection with U.S. Appl. No. 14/619,813, filed Feb. 11, 2015, 11 pages.

Fireball DVD and Music Manager DVD100 Installation and User's Guide, Copyright 2003, 185 pages.

Fireball MP-200 User's Manual, Copyright 2006, 93 pages.

Fireball Remote Control Guide WD006-1-1, Copyright 2003, 19 pages.

Fireball SE-D1 User's Manual, Copyright 2005, 90 pages.

First Action Interview Office Action Summary dated Apr. 15, 2015, issued in connection with U.S. Appl. No. 14/505,027, filed Oct. 2, 2014, 6 pages.

Fober et al., "Clock Skew Compensation over a High Latency Network," Proceedings of the ICMC, 2002, pp. 548-552.

Fries et al., "The MP3 and Internet Audio Handbook: Your Guide to the Digital Music Revolution," 2000, 320 pages.

Fulton et al., "The Network Audio System: Make Your Application Sing (as Well as Dance)!" The X Resource, 1994, 14 pages.

Gaston et al., "Methods for Sharing Stereo and Multichannel Recordings Among Planetariums," Audio Engineering Society Convention Paper 7474, 2008, 15 pages.

General Event Notification Architecture Base: Client to Arbiter (Apr. 2000) (23 pages).

Sony: AIR-SA 50R Wireless Speaker, Copyright 2009, 2 pages.

Sony: Altus Quick Setup Guide ALT-SA32PC, Copyright 2009, 2 pages.

Sony: BD/DVD Home Theatre System Instruction for BDV-E300, E301 and E801, Copyright 2009, 115 pages.

Sony: BD/DVD Home Theatre System Operating Instructions for BDV-IT1000/BDV-IS1000, Copyright 2008, 159 pages.

Sony: Blu-ray Disc/DVD Home Theatre System Operating Instructions for BDV-IZ1000W, Copyright 2010, 88 pages.

Sony: DVD Home Theatre System Operating Instructions for DAV-DZ380W/DZ680W/DZ880W, Copyright 2009, 136 pages.

Sony: DVD Home Theatre System Operating Instructions for DAV-DZ870W, Copyright 2008, 128 pages.

Sony Ericsson MS500 User Guide, Copyright 2009, 2 pages.

Sony: Home Theatre System Operating Instructions for HT-IS100, Copyright 2008, 168 pages.

Sony HT-IS100, 5.1 Channel Audio System, last updated Nov. 2009, 2 pages.

Sony: Multi Channel AV Receiver Operating Instructions, 2007, 80 pages.

Sony: Multi Channel AV Receiver Operating Instructions for STR-DN1000, Copyright 2009, 136 pages.

Sony: STR-DN1000, Audio Video Receiver, last updated Aug. 2009, 2 pages.

Sony: Wireless Surround Kit Operating Instructions for WHAT-SA2, Copyright 2010, 56 pages.

Taylor, Marilou, "Long Island Sound," Audio Video Interiors, Apr. 2000, 8 pages.

Third Party Request for Ex Parte Re-Examination, U.S. Appl. No. 90/013,859 filed Nov. 7, 2016, 424 pages.

TOA Corporation, Digital Processor DP-0206 DACsys2000 Version 2.00 Software Instruction Manual, Copyright 2001, 67 pages.

Understanding Universal Plug and Play, Microsoft White Paper (Jun. 2000) (D+M_0402074-118) (45 pages).

United States Patent and Trademark Office, U.S. Appl. No. 60/490,768, filed Jul. 28, 2003, entitled "Method for synchronizing audio playback between multiple networked devices," 13 pages.

United States Patent and Trademark Office, U.S. Appl. No. 60/825,407, filed Sep. 12, 2006, entitled "Controlling and manipulating groupings in a multi-zone music or media system," 82 pages.

US 10,469,966 B2

Page 17

(56)

References Cited

OTHER PUBLICATIONS

Universal Plug and Play Device Architecture V. 1.0, (Jun. 8, 2000) (54 pages).

Universal Plug and Play in Windows XP, Tom Fout, Microsoft Corporation (Jul. 2001) (D+M_0402041-73) (33 pages).

Universal Plug and Play (“UPnP”) AV Architecture:1 for UPnP, Version 1.0, (Jun. 25, 2002) (D+M_0298151-72) (22 pages).

Universal Plug and Play Vendor’s Implementation Guide (Jan. 5, 2000) (7 pages).

UPnP AV Architecture:0.83 (Jun. 12, 2002) (SONDM000115483-504) (22 pages).

UPnP Design by Example, A Software Developers Guide to Universal Plug and Play Michael Jeronimo and JackWeast, Intel Press (D+M_0401307-818) (Apr. 2003) (511 pages).

UPnP; “Universal Plug and Play Device Architecture,” Jun. 8, 2000; version 1.0; Microsoft Corporation; pp. 1-54.

U.S. Appl. No. 13/083,499, filed Apr. 8, 2011, “Multi-Channel Pairing in a Media System.”

WANCommonInterfaceConfig:1 Service Template Version 1.01 for UPnP, Ver. 1.0 (Nov. 12, 2001) (D+M_0401820-43) (24 pages).

WANIPConnection:1 Service Template Version 1.01 for UPnP Ver. 1.0 (Nov. 12, 2001) (D+M_0401844-917) (74 pages).

WANPPPConnection:1 Service Template Version 1.01 for UPnP, Version 1.0 (Nov. 12, 2001) (D+M_0401918-2006) (89 pages).

WaveLAN High-Speed Multimode Chip Set, AVAGO0003, Agere Systems, Feb. 2003, 4 pages.

WaveLAN High-Speed Multimode Chip Set, AVAGO0005, Agere Systems, Feb. 2003, 4 pages.

WaveLAN Wireless Integration Developer Kit (WI-DK) for Access Point Developers, AVAGO0054, Agere Systems, Jul. 2003, 2 pages.

WaveLAN Wireless Integration-Developer Kit (WI-DK) Hardware Control Function (HCF), AVAGO0052, Agere Systems, Jul. 2003, 2 pages.

“Welcome. You’re watching Apple TV.” Apple TV 1st Generation Setup Guide, Apr. 8, 2008 Retrieved Oct. 14, 2014, 40 pages.

“Welcome. You’re watching Apple TV.” Apple TV 2nd Generation Setup Guide, Mar. 10, 2011 Retrieved Oct. 16, 2014, 36 pages.

“Welcome. You’re watching Apple TV.” Apple TV 3rd Generation Setup Guide, Mar. 16, 2012 Retrieved Oct. 16, 2014, 36 pages.

WI-DK Release 2 WaveLAN Embedded Drivers for VxWorks and Linux, AVAGO0056, Agere Systems, Jul. 2003, 2 pages.

WI-DK Release 2 WaveLAN END Reference Driver for VxWorks, AVAGO0044, Agere Systems, Jul. 2003, 4 pages.

WI-DK Release 2 WaveLAN LKM Reference Drivers for Linux, AVAGO0048, Agere Systems, Jul. 2003, 4 pages.

Windows Media Connect Device Compatibility Specification (Apr. 12, 2004) (16 pages).

WPA Reauthentication Rates, AVAGO0063, Agere Systems, Feb. 2004, 3 pages.

Yamaha DME 32 manual: copyright 2001.

Yamaha DME 64 Owner’s Manual; copyright 2004, 80 pages.

Yamaha DME Designer 3.5 setup manual guide; copyright 2004, 16 pages.

Yamaha DME Designer 3.5 User Manual; Copyright 2004, 507 pages.

Yamaha DME Designer software manual: Copyright 2004, 482 pages.

“Symantec pcAnywhere User’s Guide,” v 10.5.1, 1995-2002, 154 pages.

“Systemline Modular Installation Guide, Multiroom System,” Systemline, 2003, pp. 1-22.

“884+ Automatic Matrix Mixer Control System,” Ivie Technologies, Inc., 2000, pp. 1-4.

Advanced Driver Tab User Interface WaveLAN GUI Guide, AVAGO0009, Agere Systems, Feb. 2004, 4 pages.

Advisory Action dated Feb. 2, 2016, issued in connection with U.S. Appl. No. 13/848,921, filed Mar. 22, 2013, 8 pages.

Advisory Action dated Sep. 18, 2008, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 8 pages.

Advisory Action dated Feb. 1, 2016, issued in connection with U.S. Appl. No. 13/864,247, filed Apr. 17, 2013, 6 pages.

Advisory Action dated Jun. 1, 2015, issued in connection with U.S. Appl. No. 14/516,867, filed Oct. 17, 2014, 11 pages.

Advisory Action dated Mar. 2, 2015, issued in connection with U.S. Appl. No. 13/848,932, filed Mar. 22, 2013, 3 pages.

Advisory Action dated Jan. 5, 2012, issued in connection with U.S. Appl. No. 12/035,112, filed Feb. 21, 2008, 3 pages.

Advisory Action dated Oct. 5, 2015, issued in connection with U.S. Appl. No. 13/458,558, filed Apr. 27, 2012, 4 pages.

Advisory Action dated Sep. 5, 2014, issued in connection with U.S. Appl. No. 13/907,666, filed May 31, 2013, 3 pages.

Advisory Action dated Oct. 6, 2016, issued in connection with U.S. Appl. No. 13/458,558, filed Apr. 27, 2012, 4 pages.

Advisory Action dated Jan. 8, 2015, issued in connection with U.S. Appl. No. 13/705,176, filed Dec. 5, 2012, 4 pages.

Advisory Action dated Jun. 9, 2016, issued in connection with U.S. Appl. No. 13/871,795, filed Apr. 25, 2013, 3 pages.

Advisory Action dated Feb. 10, 2016, issued in connection with U.S. Appl. No. 13/871,795, filed Apr. 26, 2013, 3 pages.

Advisory Action dated Nov. 12, 2014, issued in connection with U.S. Appl. No. 13/907,666, filed May 31, 2013, 6 pages.

Advisory Action dated Apr. 15, 2015, issued in connection with U.S. Appl. No. 14/184,526, filed Feb. 19, 2014, 9 pages.

Advisory Action dated Apr. 15, 2015, issued in connection with U.S. Appl. No. 14/184,935, filed Feb. 20, 2014, 9 pages.

Advisory Action dated Dec. 22, 2011, issued in connection with U.S. Appl. No. 11/853,790, filed Sep. 11, 2007, 2 pages.

Advisory Action dated Mar. 25, 2015, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 5 pages.

Advisory Action dated Feb. 26, 2015, issued in connection with U.S. Appl. No. 14/184,528, filed Feb. 19, 2014, 3 pages.

Advisory Action dated Nov. 26, 2014, issued in connection with U.S. Appl. No. 14/186,850, filed Feb. 21, 2014, 9 pages.

Advisory Action dated Jul. 28, 2015, issued in connection with U.S. Appl. No. 14/184,522, filed Feb. 19, 2014, 7 pages.

Advisory Action dated Sep. 28, 2009, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 4 pages.

Agere Systems’ Voice-over-Wireless LAN (VoWLAN) Station Quality of Service, AVAGO0015, Agere Systems, Jan. 2005, 5 pages.

Akyildiz et al., “Multimedia Group Synchronization Protocols for Integrated Services Networks,” IEEE Journal on Selected Areas in Communications, 1996 pp. 162-173, vol. 14, No. 1.

Anonymous, “Information technology—Generic coding of moving pictures and associated audio information—Part 3: Audio,” ISO/IEC 13818-3, Apr. 1998, pp. 11.

Anonymous, “Transmission Control Protocol,” RFC: 793, USC/Information Sciences Institute, Sep. 1981, 91 pages.

Audio Authority: How to Install and Use the Model 1154 Signal Sensing Auto Selector, 2002, 4 pages.

Audio Authority: Model 1154B High Definition AV Auto Selector, 2008, 8 pages.

AudioSource: AMP 100 User Manual, 2003, 4 pages.

AudioTron Quick Start Guide, Version 1.0, Mar. 2001, 24 pages.

AudioTron Reference Manual, Version 3.0, May 2002, 70 pages.

AudioTron Setup Guide, Version 3.0, May 2002, 38 pages.

Automatic Profile Hunting Functional Description, AVAGO0013, Agere Systems, Feb. 2004, 2 pages.

“A/V Surround Receiver AVR-5800,” Denon Electronics, 2000, 2 pages.

“A/V System Controleer, Owner’s Manual,” B&K Compontents, Ltd., 1998, 52 pages.

AVTransport:1 Service Template Version 1.01 for UPnP, Version 1.0 (Jun. 25, 2002) (66 pages).

AXIS Communication: AXIS P8221 Network I/O Audio Module, 2009, 41 pages.

Baldwin, Roberto. “How-To: Setup iTunes DJ on Your Max and iPhone”, available at http://www.maclife.com/article/howtos/howto_setup_itunes_dj_your_mac_and_iphone, archived on Mar. 3, 2009, 4 pages.

Balfanz et al., “Network-in-a-Box: How to Set Up a Secure Wireless Network in Under a Minute,” 13th USENIX Security Symposium—Technical Paper, 2002, 23 pages.

US 10,469,966 B2

Page 18

(56)

References Cited

OTHER PUBLICATIONS

- Balfanz et al., "Talking to Strangers: Authentication in Ad-Hoc Wireless Networks," Xerox Palo Alto Research Center, 2002, 13 pages.
- Barham et al., "Wide Area Audio Synchronisation," University of Cambridge Computer Laboratory, 1995, 5 pages.
- Baudisch et al., "Flat Volume Control: Improving Usability by Hiding the Volume Control Hierarchy in the User Interface," 2004, 8 pages.
- Benslimane Abderrahim, "A Multimedia Synchronization Protocol for Multicast Groups," Proceedings of the 26th Euromicro Conference, 2000, pp. 456-463, vol. 1.
- Biersack et al., "Intra- and Inter-Stream Synchronization for Stored Multimedia Streams," IEEE International Conference on Multimedia Computing and Systems, 1996, pp. 372-381.
- Blakowski G. et al., "A Media Synchronization Survey: Reference Model, Specification, and Case Studies," Jan. 1996, pp. 5-35, vol. 14, No. 1.
- Bluetooth. "Specification of the Bluetooth System: The ad hoc SCATTERNET for affordable and highly functional wireless connectivity," Core, Version 1.0 A, Jul. 26, 1999, 1068 pages.
- Bluetooth. "Specification of the Bluetooth System: Wireless connections made easy," Core, Version 1.0 B, Dec. 1, 1999, 1076 pages.
- Bogen Communications, Inc., ProMatrix Digitally Matrixed Amplifier Model PM3180, Copyright 1996, 2 pages.
- Brassil et al., "Enhancing Internet Streaming Media with Cueing Protocols," 2000, 9 pages.
- Breebaart et al., "Multi-Channel Goes Mobile: MPEG Surround Binaural Rendering," AES 29th International Conference, Sep. 2-4, 2006, pp. 1-13.
- Bretl W.E., et al., MPEG2 Tutorial [online], 2000 [retrieved on Jan. 13, 2009] Retrieved from the Internet: (<http://www.bretl.com/mpeghtml/MPEGIndex.htm>), pp. 1-23.
- Buerk et al., "AVTransport:1 Service Template Version 1.01," Contributing Members of the UPnP Forum, Jun. 25, 2002, 67 pages.
- Canadian Intellectual Property Office, Canadian Office Action dated Apr. 4, 2016, issued in connection with Canadian Patent Application No. 2,842,342, 5 pages.
- Canadian Intellectual Property Office, Canadian Office Action dated Sep. 14, 2015, issued in connection with Canadian Patent Application No. 2,842,342, 2 pages.
- Canadian Patent Office, Canadian Office Action dated Aug. 30, 2017, issued in connection with CA Application No. 2947275, 5 pages.
- Canadian Patent Office, Office Action dated Apr. 10, 2015, issued in connection with Canadian Patent Application No. 2,832,542, 3 pages.
- Cen et al., "A Distributed Real-Time MPEG Video Audio Player," Department of Computer Science and Engineering, Oregon Graduate Institute of Science and Technology, 1995, 12 pages.
- Chakrabarti et al., "A Remotely Controlled Bluetooth Enabled Environment," IEEE, 2004, pp. 77-81.
- Change Notification: Agere Systems WaveLan Multimode Reference Design (D2 to D3), AVAGO0042, Agere Systems, Nov. 2004, 2 pages.
- Chinese Patent Office, First Office Action dated Oct. 12, 2018, issued in connection with Chinese Application No. 201610804134.8, 10 pages.
- Chinese Patent Office, Office Action dated Jul. 5, 2016, issued in connection with Chinese Patent Application No. 201380044380.2, 25 pages.
- Chinese Patent Office, Office Action dated Nov. 27, 2015, issued in connection with Chinese Patent Application No. 201280028038.9, 26 pages.
- Connection Manager: 1 Service Template Version 1.01 for UPnP, Version 1.0 (Jun. 25, 2002) (25 pages).
- ContentDirectory:1 Service Template Version 1.01 for UPnP, Version 1.0 (Jun. 25, 2002) (89 pages).
- Corrected Notice of Allowance dated Mar. 12, 2015, issued in connection with U.S. Appl. No. 13/630,565, filed Sep. 28, 2012, 4 pages.
- Corrected Notice of Allowance dated Aug. 19, 2015, issued in connection with U.S. Appl. No. 13/907,666, filed May 31, 2013, 2 pages.
- Corrected Notice of Allowance dated Oct. 30, 2015, issued in connection with U.S. Appl. No. 13/013,740, filed Jan. 25, 2011, 2 pages.
- Corrected Notice of Allowance dated Dec. 6, 2017, issued in connection with U.S. Appl. No. 15/228,685, filed Aug. 4, 2016, 5 pages.
- Creative, "Connecting Bluetooth Devices with Creative D200," <http://support.creative.com/kb/ShowArticle.aspx?url=http://ask.creative.com:80/SRVS/CGI-BIN/WEBCGI.EXE/?St=106,E=000000000396859016,K=9377,Sxi=8,VARSET=ws:http://us.creative.com.case=63350>, available on Nov. 28, 2011, 2 pages.
- Crown PIP Manual available for sale at least 2004, 68 pages.
- Dannenberg et al., "A. System Supporting Flexible Distributed Real-Time Music Processing," Proceedings of the 2001 International Computer Music Conference, 2001, 4 pages.
- Dannenberg, Roger B., "Remote Access to Interactive Media," Proceedings of the SPIE 1785, 1993, pp. 230-237.
- Day, Rebecca, "Going Elan!" Primedia Inc., 2003, 4 pages.
- Deep-Sleep Implementation in WL60011 for IEEE 802.11b Applications, AVAGO0020, Agere Systems, Jul. 2004, 22 pages.
- Dell, Inc. "Dell Digital Audio Receiver: Reference Guide," Jun. 2000, 70 pages.
- Dell, Inc. "Start Here," Jun. 2000, 2 pages.
- "Denon 2003-2004 Product Catalog," Denon, 2003-2004, 44 pages.
- Denon AV Surround Receiver AVR-1604/684 User's Manual, 2004, 128 pages.
- Denon AV Surround Receiver AVR-5800 Operating Instructions, Copyright 2000, 67 pages.
- Designing a UPnP AV MediaServer, Nelson Kidd (2003) (SONDM000115062-116) (55 pages).
- Dorwaldt, Carl, "EASE 4.1 Tutorial," Renkus-Heinz, Inc., 2004, 417 pages.
- "DP-0206 Digital Signal Processor," TOA Electronics, Inc., 2001, pp. 1-12.
- Dynaudio Acoustics Air Series, <http://www.soundonsound.com/sos/sep02/articles/dynaudioair.asp>, 2002, 4 pages.
- European Patent Office, European Extended Search Report dated Mar. 7, 2016, issued in connection with EP Application No. 13810340.3, 9 pages.
- European Patent Office, European Extended Search Report dated Feb. 28, 2014, issued in connection with EP Application No. 13184747.7, 8 pages.
- European Patent Office, European Extended Search Report dated Mar. 31, 2015, issued in connection with EP Application No. 14181454.1, 9 pages.
- European Patent Office, European Search Report dated Jul. 5, 2016, issued in connection with European Patent Application No. 16156935.5, 9 pages.
- European Patent Office, Examination Report dated Mar. 22, 2016, issued in connection with European Patent Application No. EP14181454.1, 6 pages.
- European Patent Office, Examination Report dated Oct. 24, 2016, issued in connection with European Patent Application No. 13808623.6, 4 pages.
- European Patent Office, Extended European Search Report dated Jul. 5, 2016, issued in connection with European Patent Application No. 16156940.5, 7 pages.
- Falcone, John, "Sonos BU150 Digital Music System review," CNET, CNET [online] Jul. 27, 2009 [retrieved on Mar. 16, 2016], 11 pages Retrieved from the Internet: URL:<http://www.cnet.com/products/sonos-bu150-digital-music-system/>.
- Faller, Christof, "Coding of Spatial Audio Compatible with Different Playback Formats," Audio Engineering Society Convention Paper (Presented at the 117th Convention), Oct. 28-31, 2004, 12 pages.
- File History of Re-Examination Application No. 90/013,423.

US 10,469,966 B2

Page 19

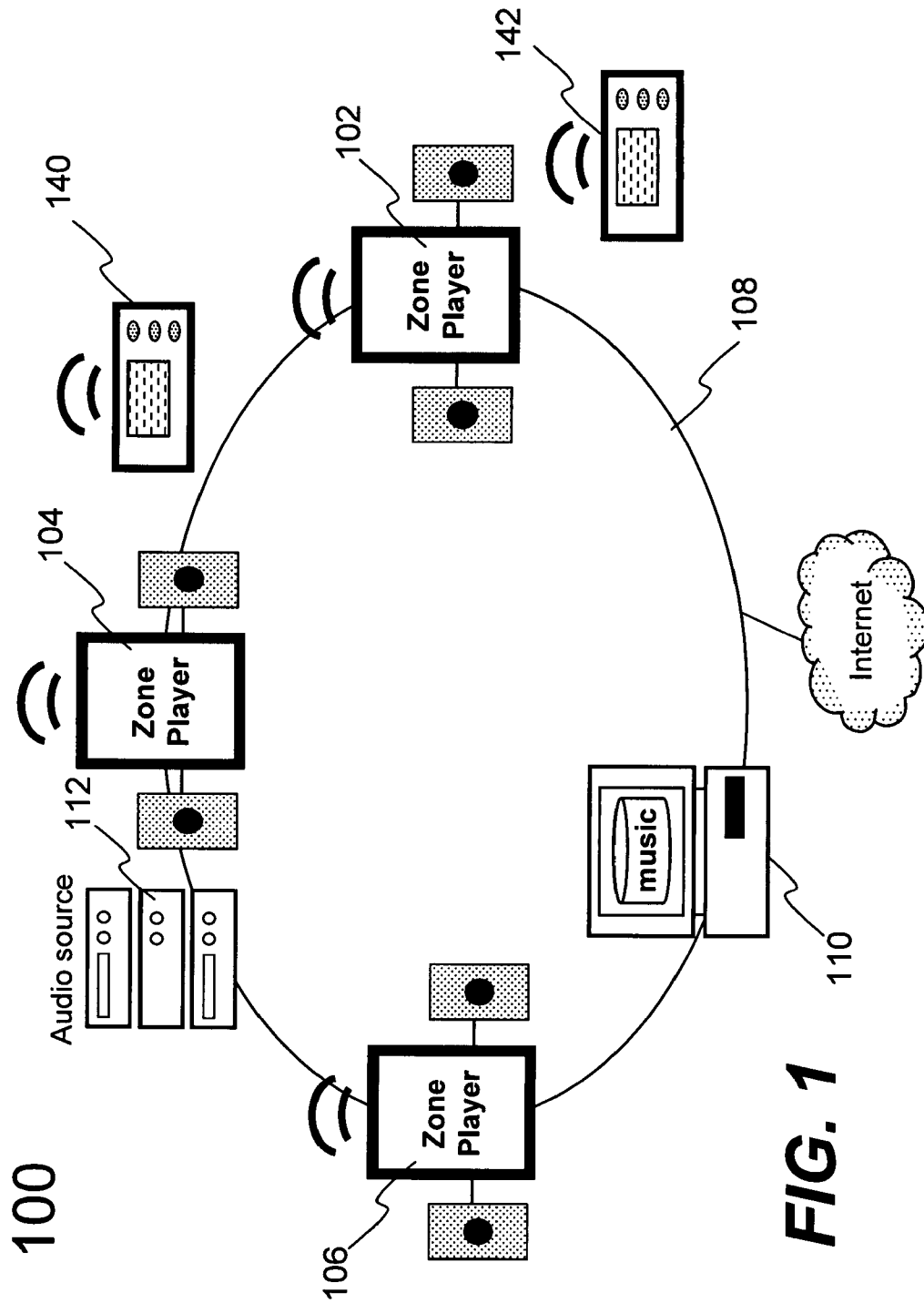
(56)

References Cited

OTHER PUBLICATIONS

Final Office Action dated Jun. 5, 2014, issued in connection with U.S. Appl. No. 13/907,666, filed May 31, 2013, 12 pages.
Final Office Action dated Jul. 13, 2009, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 16 pages.
Final Office Action dated Sep. 13, 2012, issued in connection with U.S. Appl. No. 13/297,000, filed Nov. 15, 2011, 17 pages.
Final Office Action dated Nov. 18, 2015, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 56 pages.
Final Office Action dated Oct. 21, 2011, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 19 pages.
Final Office Action dated Jul. 23, 2014, issued in connection with U.S. Appl. No. 13/896,037, filed May 16, 2013, 12 pages.
AuviTran AVB32-ES User's Manual, 2005, 25 pages.
AuviTran AVKIT-ES for AD8HR User's Manual, 2005, 15 pages.
CobraNet Manager, Direct control over your audio network. www.peakaudio.com/CobraNet/FAQ.html, 2005 [retrieved online Jul. 12, 2019 at web.archive.org/web/20050403214230/http://www.peakaudio.com/CobraNet/FAQ] 13 pages.
Non-Final Office Action dated Jul. 17, 2019, issued in connection with U.S. Appl. No. 15/130,919, filed Apr. 15, 2016, 15 pages.
Non-Final Office Action dated Aug. 28, 2019, issued in connection with U.S. Appl. No. 16/422,160, filed May 24, 2019, 14 pages.
Non-Final Office Action dated Jul. 5, 2019, issued in connection with U.S. Appl. No. 16/383,561, filed Apr. 12, 2019, 12 pages.

* cited by examiner



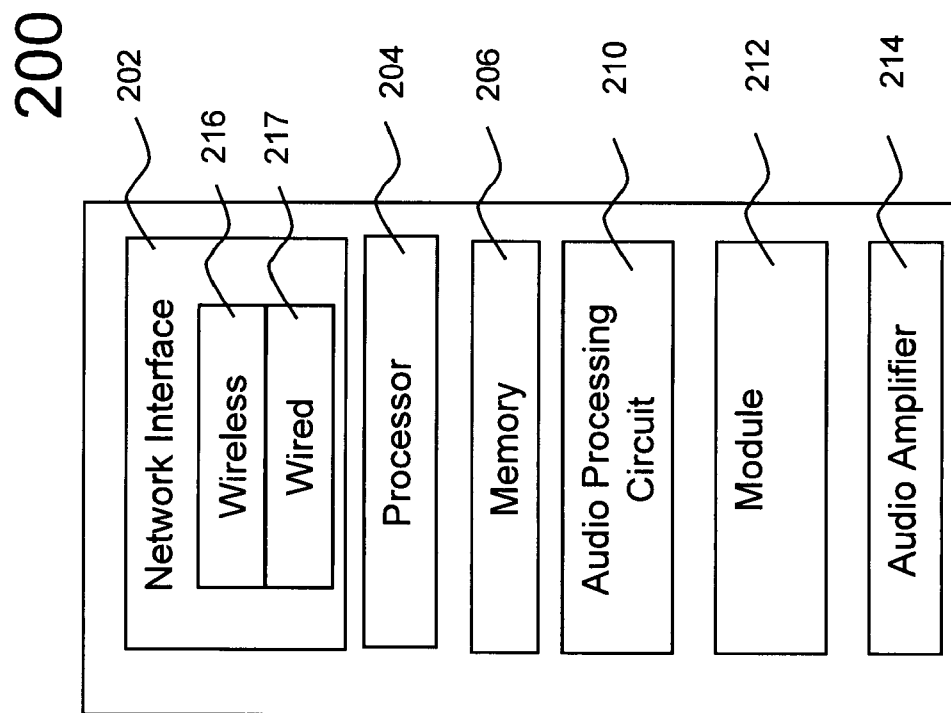


FIG. 2A

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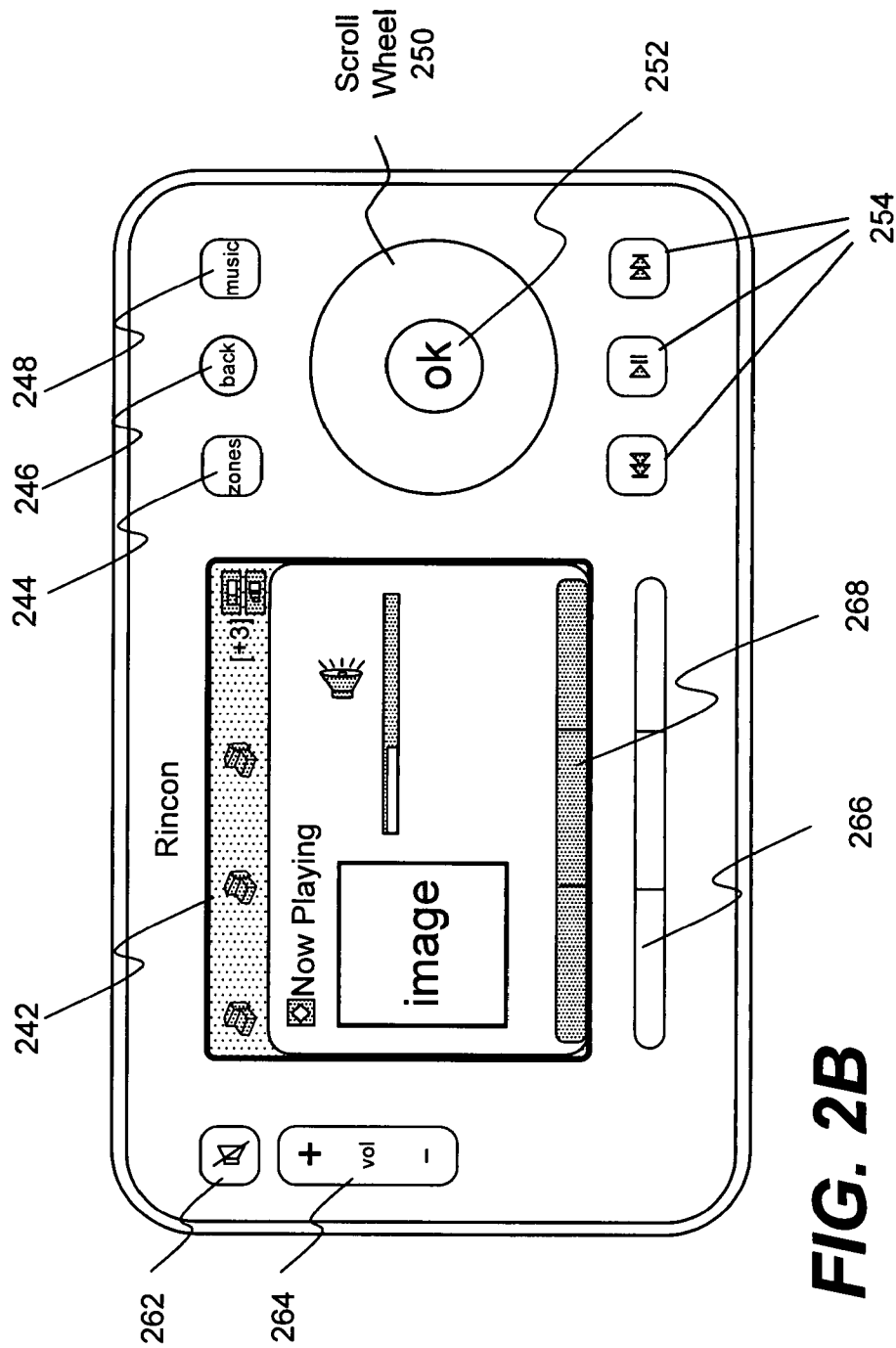


FIG. 2B

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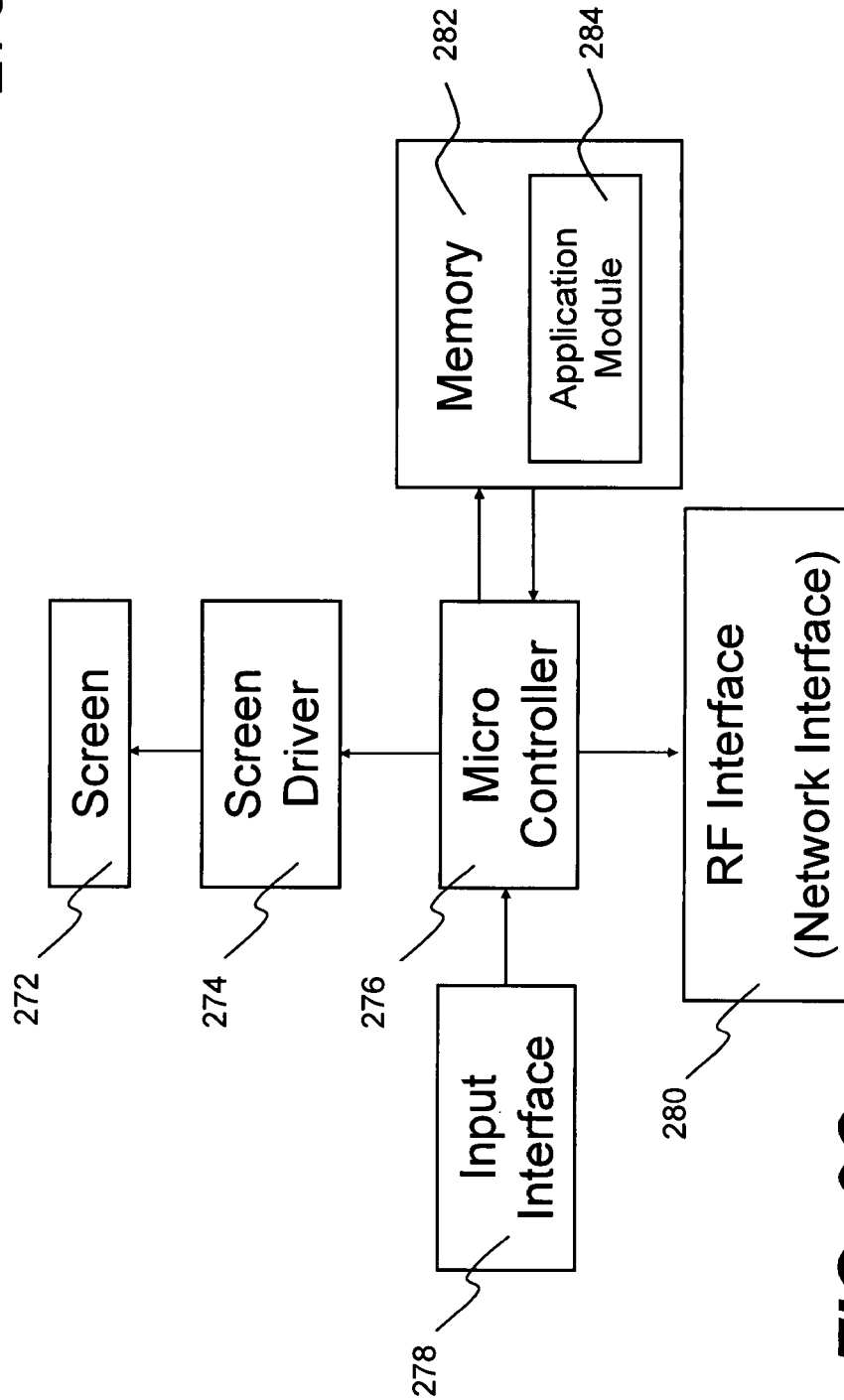


FIG. 2C

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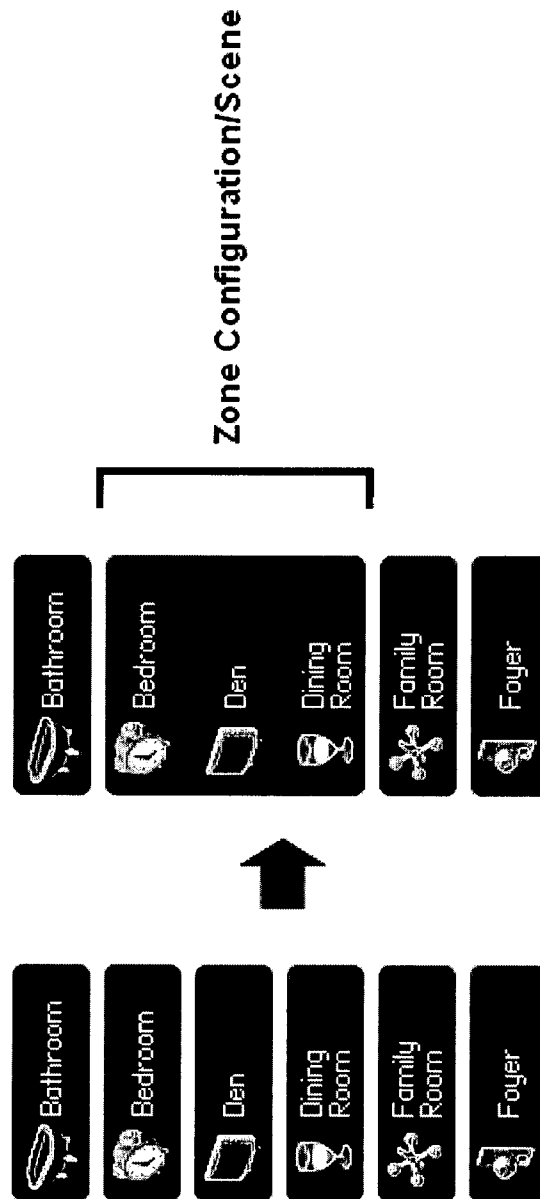


FIG. 3A

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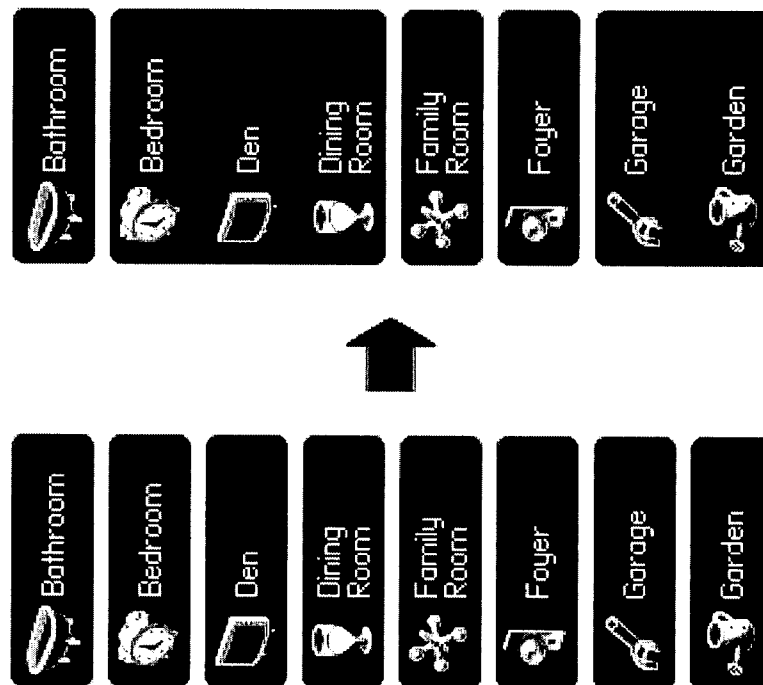
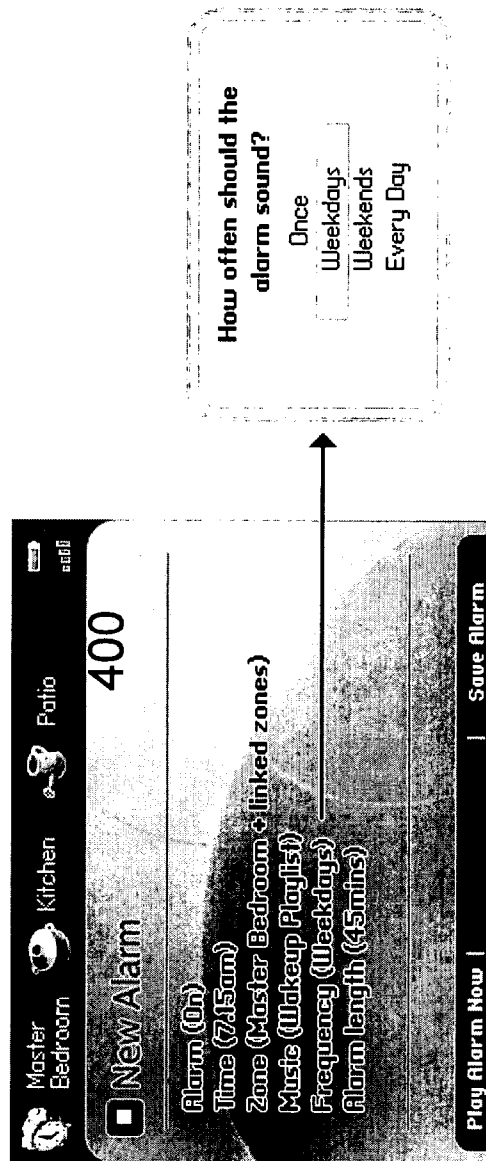


FIG. 3B

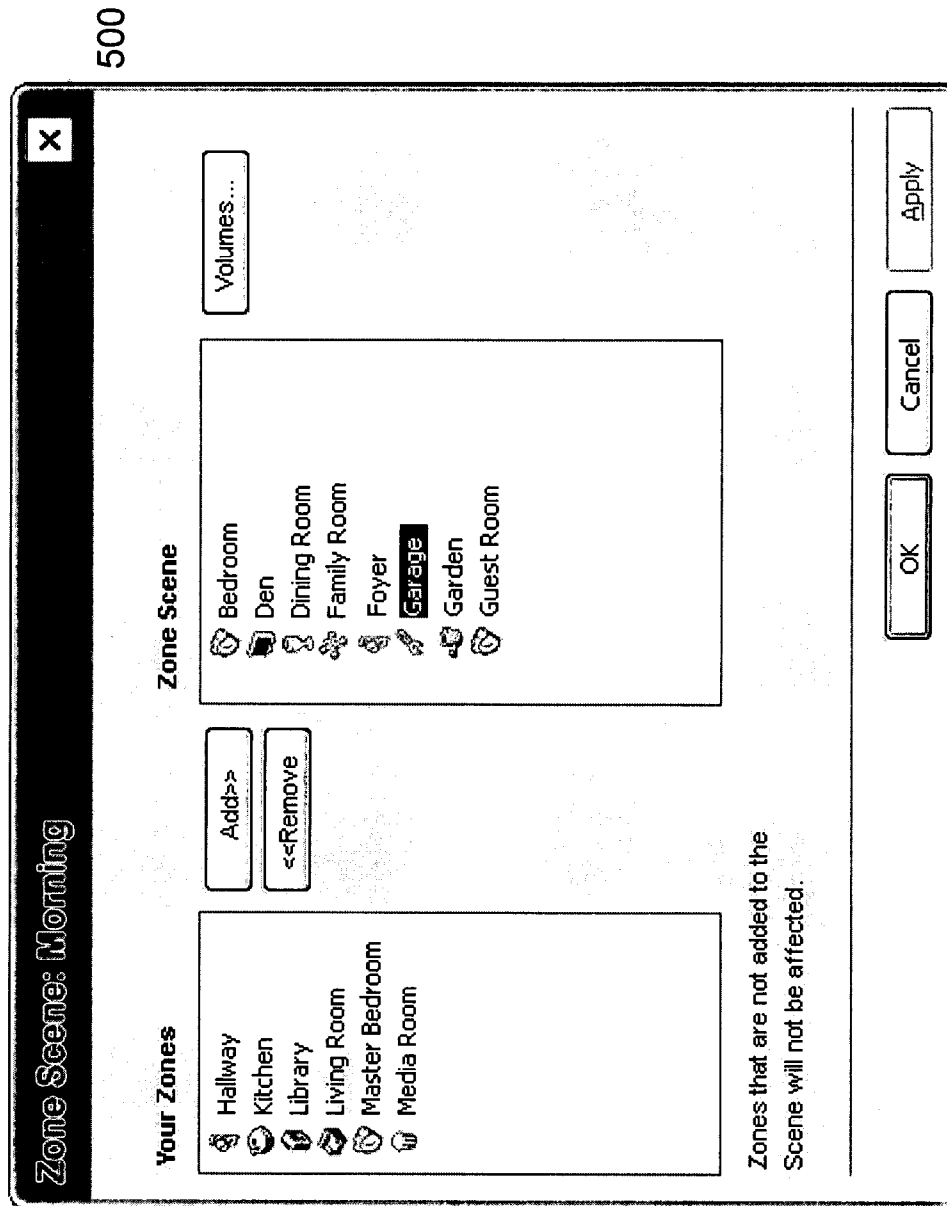


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**FIG. 5A**

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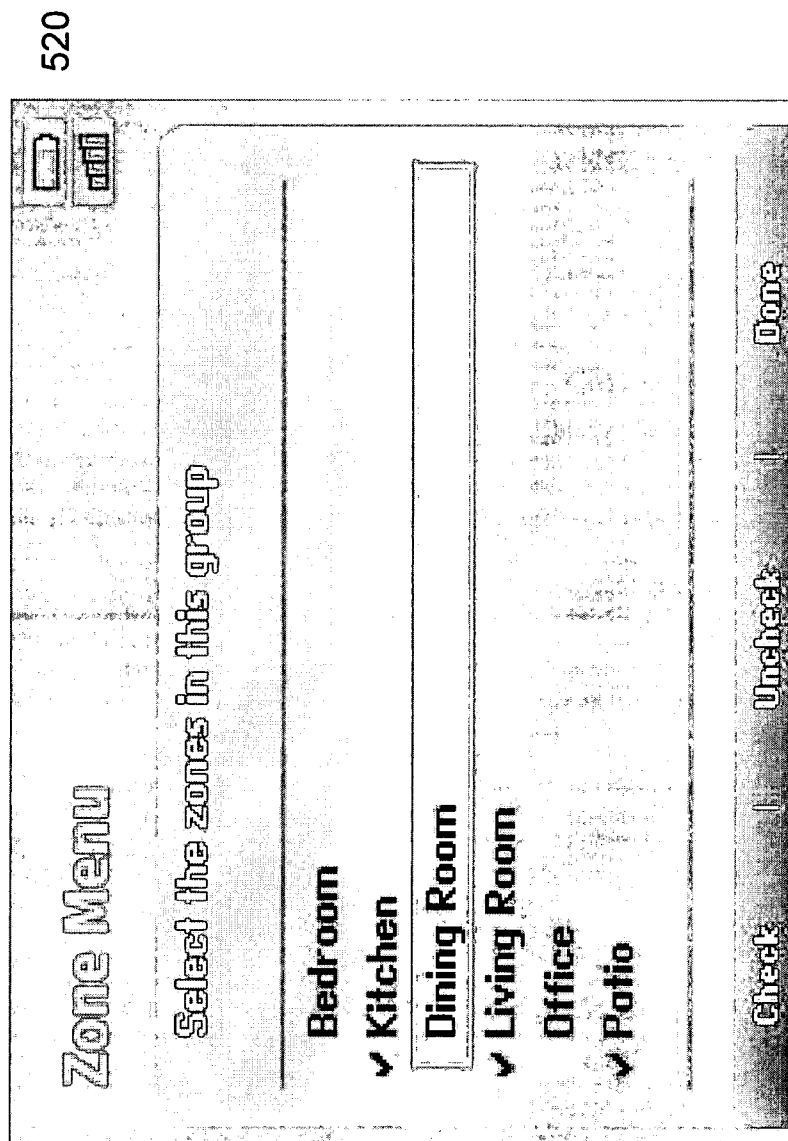


FIG. 5B

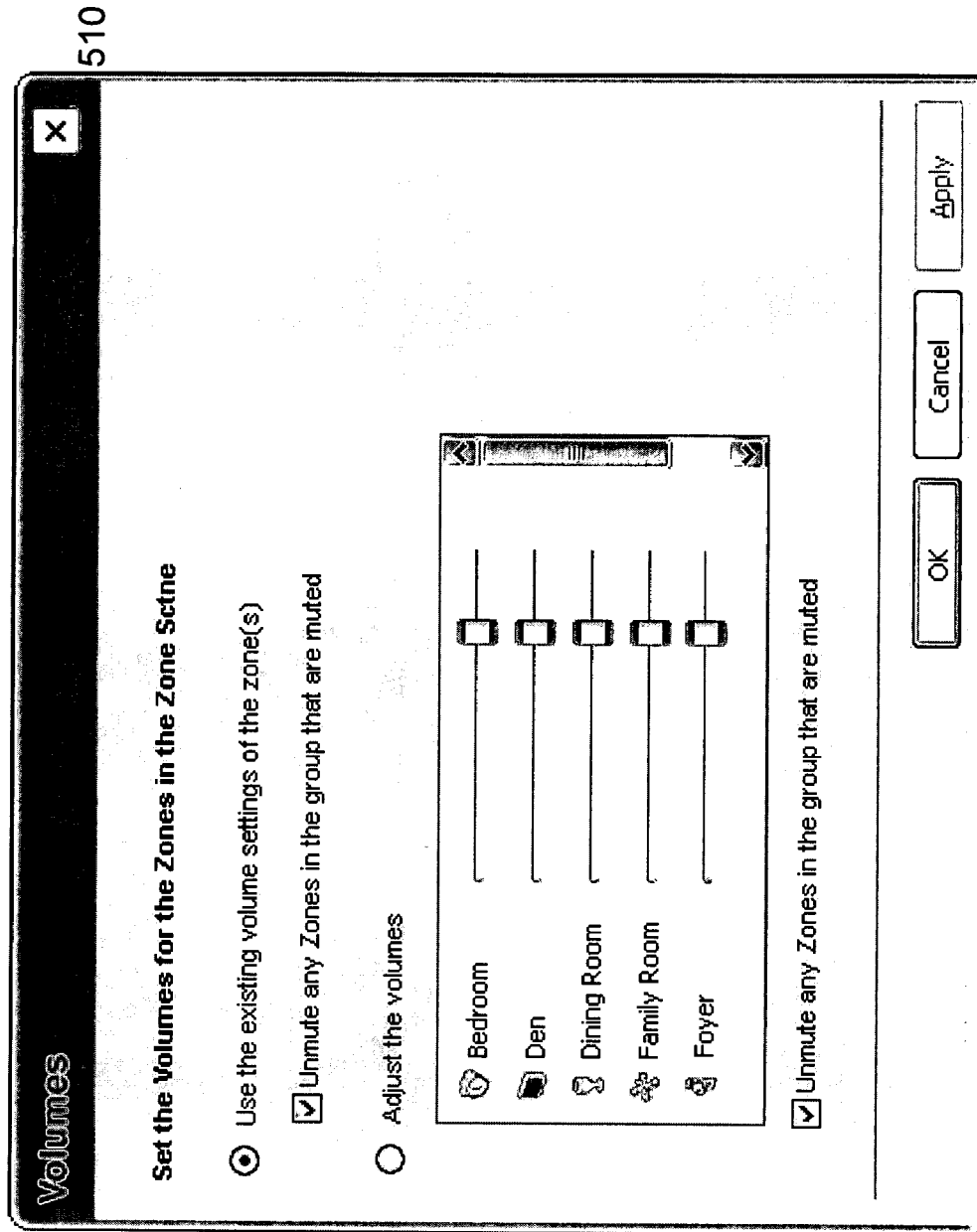
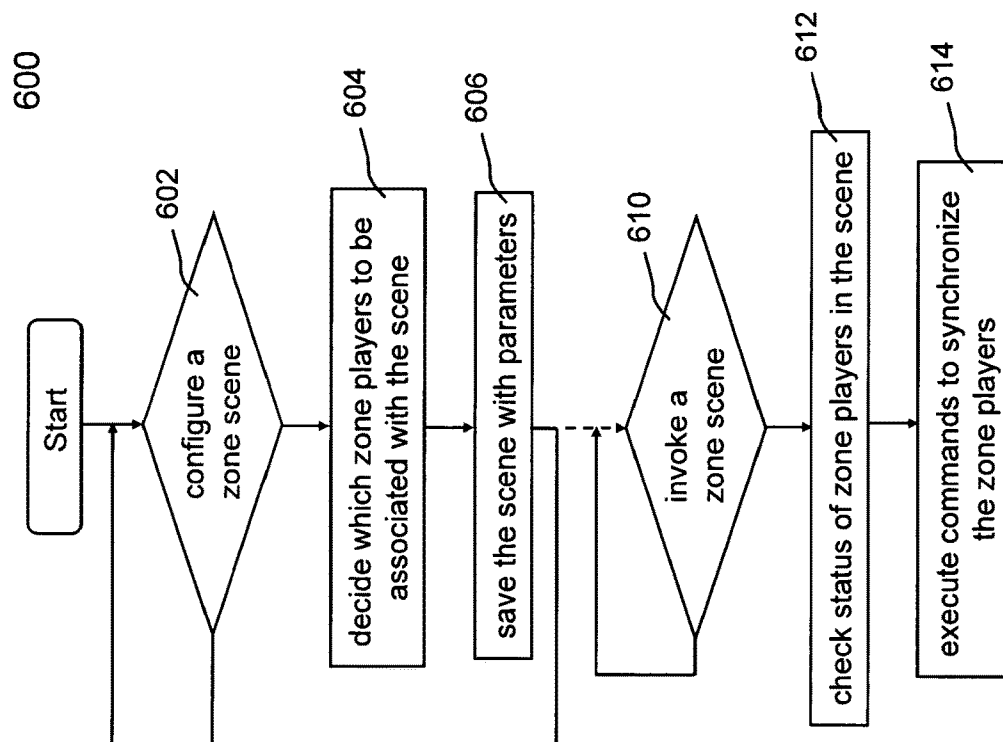


FIG. 5C

**FIG. 6**

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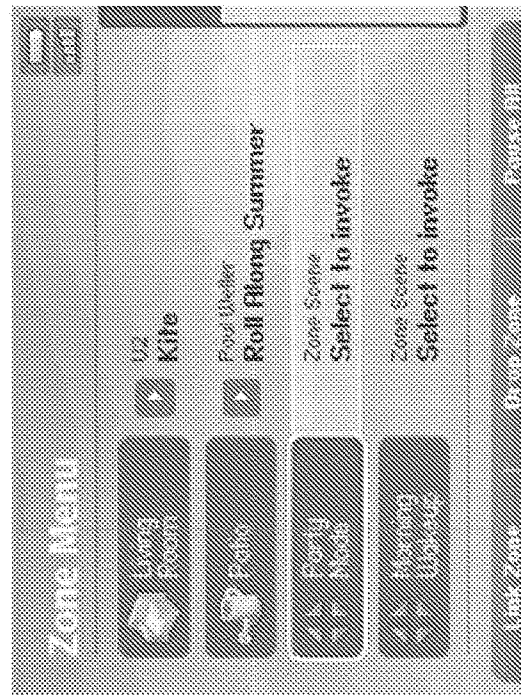


FIG. 7

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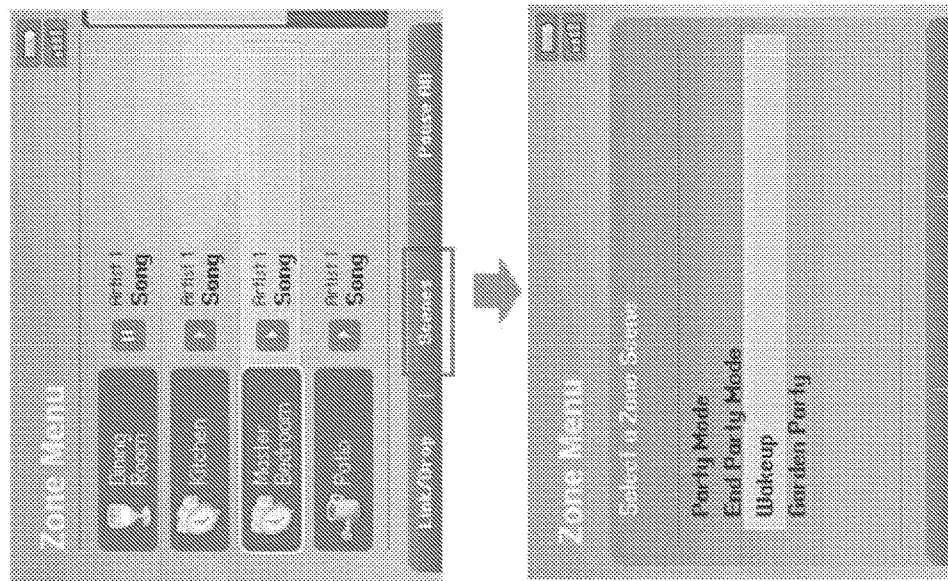


FIG. 8

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ZONE SCENE MANAGEMENT**CROSS REFERENCE TO RELATED APPLICATIONS**

This application is a continuation of and claims priority to U.S. patent application Ser. No. 15/130,919, filed on Apr. 15, 2016, entitled "ZONE SCENE ACTIVATION," which is a continuation of U.S. patent application Ser. No. 14/465,457, filed on Aug. 21, 2014, entitled "METHOD AND APPARATUS FOR UPDATING ZONE CONFIGURATIONS IN A MULTI-ZONE SYSTEM," which is a continuation of U.S. patent application Ser. No. 13/896,829, filed on May 17, 2013, entitled "METHOD AND APPARATUS FOR UPDATING ZONE CONFIGURATIONS IN A MULTI-ZONE SYSTEM," which is a continuation of U.S. patent application Ser. No. 11/853,790, filed Sep. 11, 2007, entitled "CONTROLLING AND MANIPULATING GROUPINGS IN A MULTI-ZONE MEDIA SYSTEM," which claims priority to U.S. Provisional Application No. 60/825,407 filed on Sep. 12, 2006, entitled "CONTROLLING AND MANIPULATING GROUPINGS IN A MULTI-ZONE MEDIA SYSTEM," each of which is hereby incorporated by reference in its entirety for all purposes.

BACKGROUND OF THE INVENTION**Field of the Invention**

The invention is generally related to the area of consumer electronics and human-computer interaction. In particular, the invention is related to method and apparatus for controlling or manipulating a plurality of multimedia players in a multi-zone system.

An enduring passion for quality audio reproduction or system is continuing to drive demands from users. One of the demands includes an audio system in a house in which, for example, one could grill to classic rock on a patio while another one may cook up his/her own music selections in a kitchen. This is all at the same time while a teenager catches a ballgame in a family room, and another one blasts pop in a bedroom. And the best part of such audio system is that each family member does not need his or her own stereo system—one system gives everyone access to all the music sources.

Currently, one of the systems that can meet part of such demand is a conventional multi-zone audio system that usually includes a number of audio players. Each of the audio players has its own amplifier(s) and a set of speakers and typically installed in one place (e.g., a room). In order to play an audio source at one location, the audio source must be provided locally or from a centralized location. When the audio source is provided locally, the multi-zone audio system functions as a collection of many stereo systems, making source sharing difficult. When the audio source is provided centrally, the centralized location may include a juke box, many compact discs, an AM or FM radio, tapes, or others. To send an audio source to an audio player demanding such source, a cross-bar type of device is used to prevent the audio source from going to other audio players that may be playing other audio sources.

In order to achieve playing different audio sources in different audio players, the traditional multi-zone audio system is generally either hard-wired or controlled by a pre-configured and pre-programmed controller. While the pre-programmed configuration may be satisfactory in one situation, it may not be suitable for another situation. For

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example, a person would like to listen to broadcast news from his/her favorite radio station in a bedroom, a bathroom and a den while preparing to go to work in the morning. The same person may wish to listen in the den and the living room to music from a compact disc in the evening. In order to satisfy such requirements, two groups of audio players must be established. In the morning, the audio players in the bedroom, the bathroom and the den need to be grouped for the broadcast news. In the evening, the audio players in the den and the living room are grouped for the music. Over the weekend, the audio players in the den, the living room, and a kitchen are grouped for party music. Because the morning group, the evening group and the weekend group contain the den, it can be difficult for the traditional system to accommodate the requirement of dynamically managing the ad hoc creation and deletion of groups.

There is a need for dynamic control of the audio players as a group. With a minimum manipulation, the audio players may be readily grouped. In a traditional multi-zone audio system, the audio players have to be adjusted one at a time, resulting in an inconvenient and non-homogenous audio environment. Further, there is a need to individually or systematically adjust the audio volume of the audio players.

SUMMARY OF THE INVENTION

This section is for the purpose of summarizing some aspects of the present invention and to briefly introduce some preferred embodiments. Simplifications or omissions in this section as well as in the abstract or the title of this description may be made to avoid obscuring the purpose of this section, the abstract and the title. Such simplifications or omissions are not intended to limit the scope of the present invention.

In general, the present invention pertains to controlling a plurality of multimedia players, or simply players, in groups. According to one aspect of the present invention, a mechanism is provided to allow a user to group some of the players according to a theme or scene, where each of the players is located in a zone. When the scene is activated, the players in the scene react in a synchronized manner. For example, the players in the scene are all caused to play an audio source or music in a playlist, wherein the audio source may be located anywhere on a network.

According to another aspect of the present invention, the scene may be activated at any time or a specific time. A user may activate the scene at any time so that only some selected zones in an entertainment system facilitate a playback of an audio source. When the scene is activated at a specific time, the scene may be used as an alarm or buzzer.

According to still another aspect of the present invention, a controlling device (also referred to herein as controller) is provided to facilitate a user to select any of the players in the system to form respective groups each of which is set up per a scene. Although various scenes may be saved in any of the members in a group, commands are preferably sent from the controller to the rest of the members when one of the scenes is executed. Depending on implementation, the commands include parameters pertaining to identifiers of the players, volumes settings, audio source and etc.

According to yet another aspect of the present invention, a configurable module is implemented in the controlling device that provides interactive graphic user interface for forming, managing and controlling groups in the system, de-grouping a group or adjusting audio volume of individual players or a group of players.

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The present invention may be implemented in many forms including software, hardware or a combination of both. According to one embodiment, the present invention is directed to a method for groupings in a multi-zone media system, the method comprises providing a mechanism to allow a user to determine which players in the system to be associated with a theme representing a group; and configuring the theme with parameters pertaining to the players, wherein the theme is activated at anytime or a specific time so that the players react in a synchronized manner. The players in a scene are synchronized to play a multimedia file when the scene is activated.

According to another embodiment, the present invention is directed to an entertainment system for grouping players, the system comprises: a plurality of players, each located in one zone; and a controller providing a mechanism to allow a user to select which of the players to be associated with a theme representing a group; and configure the theme with parameters pertaining to the selected players, wherein the theme is activated at anytime or a specific time so that the selected players react in a synchronized manner. As a result, the selected players are synchronized to play a multimedia that is in a digital format and retrieved from a source over a network.

One of the objects, features, and advantages of the present invention is to remotely control a plurality of multimedia players in a multi-zone system, playing and controlling the audio source synchronously if the players are grouped together, or playing and controlling the audio source individually if the players are disassociated with each other.

Other objects, features, and advantages of the present invention will become apparent upon examining the following detailed description of an embodiment thereof, taken in conjunction with the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features, aspects, and advantages of the present invention will become better understood with regard to the following description, appended claims, and accompanying drawings where:

FIG. 1 shows an exemplary configuration in which the present invention may be practiced;

FIG. 2A shows an exemplary functional block diagram of a player in accordance with the present invention;

FIG. 2B shows an example of a controller that may be used to remotely control one of more players of FIG. 2A;

FIG. 2C shows an exemplary internal functional block diagram of a controller in accordance with one embodiment of the present invention;

FIG. 3A provides an illustration of one zone scene, where the left column shows the starting zone grouping—all zones are separate, the column on the right shows the effects of grouping the zones to make a group of 3 zones named after “Morning”;

FIG. 3B shows that a user defines multiple groups to be gathered at the same time;

FIG. 4 shows an exemplary user interface that may be displayed on a controller or a computer of FIG. 1;

FIG. 5A shows a user interface to allow a user to form a scene;

FIG. 5B shows another user interface 520 to allow a user to form a scene;

FIG. 5C shows a user interface to allow a user to adjust a volume level of the zone players in a zone scene individually or collectively;

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FIG. 6 shows a flowchart or process of providing a player theme or a zone scene for a plurality of players, where one or more of the players are placed in a zone; and

FIG. 7 shows an example user interface for invoking a zone scene; and

FIG. 8 shows another example user interface for invoking a zone scene.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The detailed description of the invention is presented largely in terms of procedures in terms of procedures, steps, logic blocks, processing, and other symbolic representations that directly or indirectly resemble the operations of data processing devices coupled to networks. These process descriptions and representations are typically used by those skilled in the art to most effectively convey the substance of their work to others skilled in the art. Numerous specific details are set forth in order to provide a thorough understanding of the present invention. However, it will become obvious to those skilled in the art that the present invention may be practiced without these specific details. In other instances, well known methods, procedures, components, and circuitry have not been described in detail to avoid unnecessarily obscuring aspects of the present invention.

Reference herein to “one embodiment” or “an embodiment” means that a particular feature, structure, or characteristic described in connection with the embodiment can be included in at least one embodiment of the invention. The appearances of the phrase “in one embodiment” in various places in the specification are not necessarily all referring to the same embodiment, nor are separate or alternative embodiments mutually exclusive of other embodiments. Further, the order of blocks in process flowcharts or diagrams representing one or more embodiments of the invention do not inherently indicate any particular order nor imply any limitations in the invention.

Referring now to the drawings, in which like numerals refer to like parts throughout the several views. FIG. 1 shows an exemplary configuration 100 in which the present invention may be practiced. The configuration may represent, but not be limited to, a part of a residential home, a business building or a complex with multiple zones. There are a number of multimedia players of which three examples 102, 104 and 106 are shown as audio devices. Each of the audio devices may be installed or provided in one particular area or zone and hence referred to as a zone player herein.

As used herein, unless explicitly stated otherwise, an audio source or audio sources are in digital format and can be transported or streamed over a data network. To facilitate the understanding of the present invention, it is assumed that the configuration 100 represents a home. Thus, the zone player 102 and 104 may be located in two of the bedrooms respectively while the zone player 106 may be installed in a living room. All of the zone players 102, 104 and 106 are coupled directly or indirectly to a data network 108. In addition, a computing device 110 is shown to be coupled on the network 108. In reality, any other devices such as a home gateway device, a storage device, or an MP3 player may be coupled to the network 108 as well.

The network 108 may be a wired network, a wireless network or a combination of both. In one example, all devices including the zone players 102, 104 and 106 are coupled to the network 108 by wireless means based on an industry standard such as IEEE 802.11. In yet another example, all devices including the zone players 102, 104 and

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106 are part of a local area network that communicates with a wide area network (e.g., the Internet).

Many devices on the network **108** are configured to download and store audio sources. For example, the computing device **110** can download audio sources from the Internet and store the downloaded sources locally for sharing with other devices on the Internet or the network **108**. The computing device **110** or any of the zone players can also be configured to receive streaming audio. Shown as a stereo system, the device **112** is configured to receive an analog audio source (e.g., from broadcasting) or retrieve a digital audio source (e.g., from a compact disk). The analog audio sources can be converted to digital audio sources. In accordance with the present invention, the audio source may be shared among the devices on the network **108**.

Two or more zone players may be grouped together to form a new zone group. Any combinations of zone players and an existing zone group may be grouped together. In one instance, a new zone group is formed by adding one zone player to another zone player or an existing zone group.

Referring now to FIG. 2A, there is shown an exemplary functional block diagram of a zone player **200** in accordance with the present invention. The zone player **200** includes a network interface **202**, a processor **204**, a memory **206**, an audio processing circuit **210**, a module **212**, and optionally, an audio amplifier **214** that may be internal or external. The network interface **202** facilitates a data flow between a data network (i.e., the data network **108** of FIG. 1) and the zone player **200** and typically executes a special set of rules (i.e., a protocol) to send data back and forth. One of the common protocols used in the Internet is TCP/IP (Transmission Control Protocol/Internet Protocol). In general, a network interface manages the assembling of an audio source or file into smaller packets that are transmitted over the data network or reassembles received packets into the original source or file. In addition, the network interface **202** handles the address part of each packet so that it gets to the right destination or intercepts packets destined for the zone player **200**.

The network interface **202** may include one or both of a wireless interface **216** and a wired interface **217**. The wireless interface **216**, also referred to as a RF interface, provides network interface functions by a wireless means for the zone player **200** to communicate with other devices in accordance with a communication protocol (such as the wireless standard IEEE 802.11a, 802.11b or 802.11g). The wired interface **217** provides network interface functions by a wired means (e.g., an Ethernet cable). In one embodiment, a zone player includes both of the interfaces **216** and **217**, and other zone players include only a RF or wired interface. Thus these other zone players communicate with other devices on a network or retrieve audio sources via the zone player. The processor **204** is configured to control the operation of other parts in the zone player **200**. The memory **206** may be loaded with one or more software modules that can be executed by the processor **204** to achieve desired tasks. According to one aspect of the present invention, a software module implementing one embodiment of the present invention is executed, the processor **204** operates in accordance with the software module in reference to a saved zone group configuration characterizing a zone group created by a user, the zone player **200** is caused to retrieve an audio source from another zone player or a device on the network.

According to one embodiment of the present invention, the memory **206** is used to save one or more saved zone configuration files that may be retrieved for modification at

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any time. Typically, a saved zone group configuration file is transmitted to a controller (e.g., the controlling device **140** or **142** of FIG. 1, a computer, a portable device, or a TV) when a user operates the controlling device. The zone group configuration provides an interactive user interface so that various manipulations or control of the zone players may be performed.

The audio processing circuit **210** resembles most of the circuitry in an audio playback device and includes one or more digital-to-analog converters (DAC), an audio preprocessing part, an audio enhancement part or a digital signal processor and others. In operation, when an audio source is retrieved via the network interface **202**, the audio source is processed in the audio processing circuit **210** to produce analog audio signals. The processed analog audio signals are then provided to the audio amplifier **214** for playback on speakers. In addition, the audio processing circuit **210** may include necessary circuitry to process analog signals as inputs to produce digital signals for sharing with other devices on a network.

Depending on an exact implementation, the module **212** may be implemented as a combination of hardware and software. In one embodiment, the module **212** is used to save a scene. The audio amplifier **214** is typically an analog circuit that powers the provided analog audio signals to drive one or more speakers.

Referring now to FIG. 2B, there is shown an exemplary controller **240**, which may correspond to the controlling device **140** or **142** of FIG. 1. The controller **240** may be used to facilitate the control of multi-media applications, automation and others in a complex. In particular, the controller **240** is configured to facilitate a selection of a plurality of audio sources available on the network, controlling operations of one or more zone players (e.g., the zone player **200**) through a RF interface corresponding to the RF interface **216** of FIG. 2A. According to one embodiment, the wireless means is based on an industry standard (e.g., infrared, radio, wireless standard IEEE 802.11a, 802.11b or 802.11g). When a particular audio source is being played in the zone player **200**, a picture, if there is any, associated with the audio source may be transmitted from the zone player **200** to the controller **240** for display. In one embodiment, the controller **240** is used to synchronize more than one zone players by grouping the zone players in a group. In another embodiment, the controller **240** is used to control the volume of each of the zone players in a zone group individually or together.

The user interface for the controller **240** includes a screen **242** (e.g., a LCD screen) and a set of functional buttons as follows: a "zones" button **244**, a "back" button **246**, a "music" button **248**, a scroll wheel **250**, "ok" button **252**, a set of transport control buttons **254**, a mute button **262**, a volume up/down button **264**, a set of soft buttons **266** corresponding to the labels **268** displayed on the screen **242**.

The screen **242** displays various screen menus in response to a user's selection. In one embodiment, the "zones" button **244** activates a zone management screen or "Zone Menu", which is described in more details below. The "back" button **246** may lead to different actions depending on the current screen. In one embodiment, the "back" button triggers the current screen display to go back to a previous one. In another embodiment, the "back" button negates the user's erroneous selection. The "music" button **248** activates a music menu, which allows the selection of an audio source (e.g., a song) to be added to a zone player's music queue for playback.

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The scroll wheel **250** is used for selecting an item within a list, whenever a list is presented on the screen **242**. When the items in the list are too many to be accommodated in one screen display, a scroll indicator such as a scroll bar or a scroll arrow is displayed beside the list. When the scroll indicator is displayed, a user may rotate the scroll wheel **250** to either choose a displayed item or display a hidden item in the list. The “ok” button **252** is used to confirm the user selection on the screen **242**.

There are three transport buttons **254**, which are used to control the effect of the currently playing song. For example, the functions of the transport buttons may include play/pause and forward/rewind a song, move forward to a next song track, or move backward to a previous track. According to one embodiment, pressing one of the volume control buttons such as the mute button **262** or the volume up/down button **264** activates a volume panel. In addition, there are three soft buttons **266** that can be activated in accordance with the labels **268** on the screen **242**. It can be understood that, in a multi-zone system, there may be multiple audio sources being played respectively in more than one zone players. The music transport functions described herein shall apply selectively to one of the sources when a corresponding one of the zone players or zone groups is selected.

FIG. 2C illustrates an internal functional block diagram of an exemplary controller **270**, which may correspond to the controller **240** of FIG. 2B. The screen **272** on the controller **270** may be a LCD screen. The screen **272** communicates with and is commanded by a screen driver **274** that is controlled by a microcontroller (e.g., a processor) **276**. The memory **282** may be loaded with one or more application modules **284** that can be executed by the microcontroller **276** with or without a user input via the user interface **278** to achieve desired tasks. In one embodiment, an application module is configured to facilitate grouping a number of selected zone players into a zone group and synchronizing the zone players for one audio source. In another embodiment, an application module is configured to control together the audio volumes of the zone players in a zone group. In operation, when the microcontroller **276** executes one of the application modules **284**, the screen driver **274** generates control signals to drive the screen **272** to display an application specific user interface accordingly, more of which will be described below.

The controller **270** includes a network interface **280** referred to as a RF interface **280** that facilitates wireless communication with a zone player via a corresponding RF interface thereof. In one embodiment, the commands such as volume control and audio playback synchronization are sent via the RF interfaces. In another embodiment, a saved zone group configuration is transmitted between a zone player and a controller via the RF interfaces. The controller **270** may control one or more zone players, such as **102**, **104** and **106** of FIG. 1. Nevertheless, there may be more than one controllers, each preferably in a zone (e.g., a room) and configured to control any one and all of the zone players.

In one embodiment, a user creates a zone group including at least two zone players from the controller **240** that sends signals or data to one of the zone players. As all the zone players are coupled on a network, the received signals in one zone player can cause other zone players in the group to be synchronized so that all the zone players in the group playback an identical audio source or a list of identical audio sources in a timely synchronized manner. Similarly, when a user increases the audio volume of the group from the controller, the signals or data of increasing the audio volume

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for the group are sent to one of the zone players and causes other zone players in the group to be increased together in volume and in scale.

According to one implementation, an application module is loaded in memory **282** for zone group management. When a predetermined key (e.g. the “zones” button **244**) is activated on the controller **240**, the application module is executed in the microcontroller **276**. The input interface **278** coupled to and controlled by the microcontroller **276** receives inputs from a user. A “Zone Menu” is then displayed on the screen **272**. The user may start grouping zone players into a zone group by activating a “Link Zones” or “Add Zone” soft button, or de-grouping a zone group by activating an “Unlink Zones” or “Drop Zone” button. The detail of the zone group manipulation will be further discussed below.

As described above, the input interface **278** includes a number of function buttons as well as a screen graphical user interface. It should be pointed out that the controller **240** in FIG. 2B is not the only controlling device that may practice the present invention. Other devices that provide the equivalent control functions (e.g., a computing device, a hand-held device) may also be configured to practice the present invention. In the above description, unless otherwise specifically described, it is clear that keys or buttons are generally referred to as either the physical buttons or soft buttons, enabling a user to enter a command or data.

One mechanism for ‘joining’ zone players together for music playback is to link a number of zone players together to form a group. To link a number of zone players together, a user may manually link each zone player or room one after the other. For example, there is a multi-zone system that includes the following zones.

- Bathroom
- Bedroom
- Den
- Dining Room
- Family Room
- Foyer

If the user wishes to link **5** of the **6** zone players using the current mechanism, he/she must start with a single zone and then manually link each zone to that zone. This mechanism may be sometimes quite time consuming. According to one embodiment, a set of zones can be dynamically linked together using one command. Using what is referred to herein as a theme or a zone scene, zones can be configured in a particular scene (e.g., morning, afternoon, or garden), where a predefined zone grouping and setting of attributes for the grouping are automatically effectuated.

For instance, a “Morning” zone scene/configuration command would link the Bedroom, Den and Dining Room together in one action. Without this single command, the user would need to manually and individually link each zone. FIG. 3A provides an illustration of one zone scene, where the left column shows the starting zone grouping—all zones are separate, the column on the right shows the effects of grouping the zones to make a group of 3 zones named after “Morning”.

Expanding this idea further, a Zone Scene can be set to create multiple sets of linked zones. For example, a scene creates **3** separate groups of zones, the downstairs zones would be linked together, the upstairs zones would be linked together in their own group, and the outside zones (in this case the patio) would move into a group of its own.

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In one embodiment as shown in FIG. 3B, a user defines multiple groups to be gathered at the same time. For example: an “Evening Scene” is desired to link the following zones:

Group 1
Bedroom
Den
Dining Room
Group 2
Garage
Garden

where Bathroom, Family Room and Foyer should be separated from any group if they were part of a group before the Zone Scene was invoked.

One important of the features, benefits and objects in the present invention is that zones do not need to be separated before a zone scene is invoked. In one embodiment, a command is provided and links all zones in one step, if invoked. The command is in a form of a zone scene. After linking the appropriate zones, a zone scene command could apply the following attributes:

Set volumes levels in each zones (each zone can have a different volume)

Mute/Unmute zones.

Select and play specific music in the zones.

Set the play mode of the music (Shuffle, Repeat, Shuffle-repeat)

Set the music playback equalization of each zone (e.g., bass treble).

A further extension of this embodiment is to trigger a zone scene command as an alarm clock function. For instance the zone scene is set to apply at 8:00 am. It could link appropriate zones automatically, set specific music to play and then stop the music after a defined duration. Although a single zone may be assigned to an alarm, a scene set as an alarm clock provides a synchronized alarm, allowing any zones linked in the scene to play a predefined audio (e.g., a favorable song, a predefined playlist) at a specific time or for a specific duration. If, for any reason, the scheduled music failed to be played (e.g., an empty playlist, no connection to a share, failed UPnP, no Internet connection for an Internet Radio station), a backup buzzer will sound. This buzzer will be a sound file that is stored in a zone player.

FIG. 4 shows an exemplary user interface 400 that may be displayed on a controller 142 or a computer 110 of FIG. 1. The interface 400 shows a list of items that may be set up by a user to cause a scene to function at a specific time. In the embodiment shown in FIG. 4, the list of items includes “Alarm”, “Time”, “Zone”, “Music”, “Frequency” and “Alarm length”. “Alarm” can be set on or off. When “Alarm” is set on, “Time” is a specific time to set off the alarm. “Zone” shows which zone players are being set to play a specified audio at the specific time. “Music” shows what to be played when the specific time arrives. “Frequency” allows the user to define a frequency of the alarm. “Alarm length” defines how long the audio is to be played. It should be noted that the user interface 400 is provided herein to show some of the functions associated with setting up an alarm. Depending on an exact implementation, other functions, such as time zone, daylight savings, time synchronization, and time/date format for display may also be provided without departing from the present invention.

According to one embodiment, each zone player in a scene may be set up for different alarms. For example, a “Morning” scene includes three zone players, each in a bedroom, a den, and a dining room. After selecting the

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scene, the user may set up an alarm for the scene as whole. As a result, each of the zone players will be activated at a specific time.

FIG. 5A shows a user interface 500 to allow a user to form a scene. The panel on the left shows the available zones in a household. The panel on the right shows the zones that have been selected and be grouped as part of this scene. Depending on an exact implementation of a user interface, Add/Remove buttons may be provided to move zones between the panels, or zones may be dragged along between panels.

FIG. 5B shows another user interface 520 to allow a user to form a scene. The user interface 520 that may be displayed on a controller or a computing device, lists available zones in a system. The list of zones in the user interface 520 includes ALL the zones in the system, including the zones that are already grouped. A checkbox is provide next to each of the zones so that a user may check in the zones to be associated with the scene.

FIG. 5C shows a user interface 510 to allow a user to adjust a volume level of the zone players in a zone scene individually or collectively. As shown in the user interface 510, the ‘Volumes . . .’ button (shown as sliders, other forms are possible) allows the user to affect the volumes of the associated zone players when a zone scene is invoked. In one embodiment, the zone players can be set to retain whatever volume that they currently have when the scene is invoked. Additionally the user can decide if the volumes should be unmuted or muted when the scene is invoked.

FIG. 6 shows a flowchart or process 600 of providing a player theme or a zone scene for a plurality of players, where one or more of the players are placed in a zone. The process 600 is presented in accordance with one embodiment of the present invention and may be implemented in a module to be located in the memory 282 of FIG. 2C.

The process 600 is initiated only when a user decides to proceed with a zone scene at 602. The process 600 then moves to 604 where it allows a user to decide which zone players to be associated with the scene. For example, there are ten players in a household, and the scene is named after “Morning”. The user may be given an interface to select four of the ten players to be associated with the scene. At 606, the scene is saved. The scene may be saved in any one of the members in the scene. In the example of FIG. 1, the scene is saved in one of the zone players and displayed on the controller 142. In operation, a set of data pertaining to the scene includes a plurality of parameters. In one embodiment, the parameters include, but may not be limited to, identifiers (e.g., IP address) of the associated players and a playlist. The parameters may also include volume/tone settings for the associated players in the scene. The user may go back to 602 to configure another scene if desired.

Given a saved scene, a user may activate the scene at any time or set up a timer to activate the scene at 610. The process 600 can continue when a saved scene is activated at 610. At 612, upon the activation of a saved scene, the process 600 checks the status of the players associated with the scene. The status of the players means that each of the players shall be in condition to react in a synchronized manner. In one embodiment, the interconnections of the players are checked to make sure that the players communicate among themselves and/or with a controller if there is such a controller in the scene.

It is assumed that all players associated with the scene are in good condition. At 614, commands are executed with the parameters (e.g., pertaining to a playlist and volumes). In one embodiment, data including the parameters is trans-

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ported from a member (e.g., a controller) to other members in the scene so that the players are caused to synchronize an operation configured in the scene. The operation may cause all players to play back a song in identical or different volumes or to play back a pre-stored file.

One of the features, benefits and advantages in the present invention is to allow sets of related devices (controllers and operating components) to exist as a group without interfering with other components that are potentially visible on the same wired or wireless network. Each of the sets is configured to a theme or a scene.

FIG. 7 shows an example user interface for invoking a zone scene. The user interface of FIG. 7 shows a Zone Menu that includes selectable indications of zone scenes.

FIG. 8 shows another example user interface for invoking a zone scene. FIG. 8 shows a Zone Menu that includes a softkey indicating a Scenes menu. Pressing the Scenes softkey will show the Scenes menu where all the available zone scenes are shown as selectable indications.

The present invention has been described in sufficient detail with a certain degree of particularity. It is understood to those skilled in the art that the present disclosure of embodiments has been made by way of examples only and that numerous changes in the arrangement and combination of parts may be resorted without departing from the spirit and scope of the invention as claimed. While the embodiments discussed herein may appear to include some limitations as to the presentation of the information units, in terms of the format and arrangement, the invention has applicability well beyond such embodiment, which can be appreciated by those skilled in the art. Accordingly, the scope of the present invention is defined by the appended claims rather than the foregoing description of embodiments.

I claim:

1. A computing device comprising: one or more processors;

a non-transitory computer-readable medium; and program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the computing device to perform functions comprising:

while serving as a controller for a networked media playback system comprising a first zone player and at least two other zone players, wherein the first zone player is operating in a standalone mode in which the first zone player is configured to play back media individually:

receiving a first request to create a first zone scene comprising a first predefined grouping of zone players including at least the first zone player and a second zone player that are to be configured for synchronous playback of media when the first zone scene is invoked;

based on the first request, i) causing creation of the first zone scene, ii) causing an indication of the first zone scene to be transmitted to the first zone player, and iii) causing storage of the first zone scene;

receiving a second request to create a second zone scene comprising a second predefined grouping of zone players including at least the first zone player and a third zone player that are to be configured for synchronous playback of media when the second zone scene is invoked, wherein the third zone player is different than the second zone player;

based on the second request, i) causing creation of the second zone scene, ii) causing an indication of the second zone scene to be transmitted to the first zone player, and iii) causing storage of the second zone

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scene; displaying a representation of the first zone scene and a representation of the second zone scene; and while displaying the representation of the first zone scene and the representation of the second zone scene, receiving a third request to invoke the first zone scene; and

based on the third request, causing the first zone player to transition from operating in the standalone mode to operating in accordance with the first predefined grouping of zone players such that the first zone player is configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player.

2. The computing device of claim 1, further comprising program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the computing device to perform functions comprising:

while the first zone player is configured to coordinate with at least the second zone player to play back media in synchrony with at least the second zone player, receiving a fourth request to invoke the second zone scene; and

based on the fourth request, causing the first zone player to (a) cease to operate in accordance with the first predefined grouping of zone players such that the first zone player is no longer configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player and (b) begin to operate in accordance with the second predefined grouping of zone players such that the first zone player is configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player.

3. The computing device of claim 1, wherein causing storage of the first zone scene comprises causing storage of the first zone scene at a location other than the computing device, and wherein causing storage of the second zone scene comprises causing storage of the second zone scene at the location other than the computing device.

4. The computing device of claim 3, wherein the location other than the computing device comprises a zone player of the first predefined grouping of zone players.

5. The computing device of claim 1, wherein the first zone scene further comprises an indication of predetermined media to be played when the first zone scene is invoked, and wherein the computing device further comprises program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the computing device to perform functions comprising:

based on the third request, causing the first zone player to coordinate with at least the second zone player to output the predetermined media in synchrony with output of the predetermined media by at least the second zone player.

6. The computing device of claim 1, wherein the first predefined grouping of zone players does not include the third zone player, and wherein the second predefined grouping of zone players does not include the second zone player.

7. The computing device of claim 1, further comprising program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the computing device to perform functions comprising:

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before displaying the representation of the first zone scene and the representation of the second zone scene, receiving, from another device over a data network, data defining the first zone scene and data defining the second zone scene.

8. The computing device of claim 1, wherein receiving the first request comprises receiving a first set of one or more inputs via a user interface of the computing device, wherein receiving the second request comprises receiving a second set of one or more inputs via the user interface, and wherein receiving the third request comprises receiving a third set of one or more inputs via the user interface.

9. A non-transitory computer-readable medium, wherein the non-transitory computer-readable medium is provisioned with program instructions that are executable to cause a computing device to perform functions comprising:

while serving as a controller for a networked media playback system comprising a first zone player and at least two other zone players, wherein the first zone player is operating in a standalone mode in which the first zone player is configured to play back media individually;

receiving a first request to create a first zone scene comprising a first predefined grouping of zone players including at least the first zone player and a second zone player that are to be configured for synchronous playback of media when the first zone scene is invoked; based on the first request, i) causing creation of the first zone scene, ii) causing an indication of the first zone scene to be transmitted to the first zone player, and iii) causing storage of the first zone scene;

receiving a second request to create a second zone scene comprising a second predefined grouping of zone players including at least the first zone player and a third zone player that are to be configured for synchronous playback of media when the second zone scene is invoked, wherein the third zone player is different than the second zone player;

based on the second request, i) causing creation of the second zone scene, ii) causing an indication of the second zone scene to be transmitted to the first zone player, and iii) causing storage of the second zone scene;

displaying a representation of the first zone scene and a representation of the second zone scene; and

while displaying the representation of the first zone scene and the representation of the second zone scene, receiving a third request to invoke the first zone scene; and based on the third request, causing the first zone player to transition from operating in the standalone mode to operating in accordance with the first predefined grouping of zone players such that the first zone player is configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player.

10. The non-transitory computer-readable medium of claim 9, wherein the non-transitory computer-readable medium is also provisioned with program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the computing device to perform functions comprising:

while the first zone player is configured to coordinate with at least the second zone player to play back media in synchrony with at least the second zone player, receiving a fourth request to invoke the second zone scene; and

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based on the fourth request, causing the first zone player to (a) cease to operate in accordance with the first predefined grouping of zone players such that the first zone player is no longer configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player and (b) begin to operate in accordance with the second predefined grouping of zone players such that the first zone player is configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player.

11. The non-transitory computer-readable medium of claim 9, wherein causing storage of the first zone scene comprises causing storage of the first zone scene at a location other than the computing device, and wherein causing storage of the second zone scene comprises causing storage of the second zone scene at the location other than the computing device.

12. The non-transitory computer-readable medium of claim 11, wherein the location other than the computing device comprises a zone player of the first predefined grouping of zone players.

13. The non-transitory computer-readable medium of claim 9, wherein the first zone scene further comprises an indication of predetermined media to be played when the first zone scene is invoked, and wherein the non-transitory computer-readable medium is also provisioned with program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the computing device to perform functions comprising:

based on the third request, causing the first zone player to coordinate with at least the second zone player to output the predetermined media in synchrony with output of the predetermined media by at least the second zone player.

14. The non-transitory computer-readable medium of claim 9, wherein the first predefined grouping of zone players does not include the third zone player, and wherein the second predefined grouping of zone players does not include the second zone player.

15. The non-transitory computer-readable medium of claim 9, wherein the non-transitory computer-readable medium further comprises program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the computing device to perform functions comprising:

before displaying the representation of the first zone scene and the representation of the second zone scene, receiving, from another device over a data network, data defining the first zone scene and data defining the second zone scene.

16. The non-transitory computer-readable medium of claim 9, wherein receiving the first request comprises receiving a first set of one or more inputs via a user interface of the computing device, wherein receiving the second request comprises receiving a second set of one or more inputs via the user interface, and wherein receiving the third request comprises receiving a third set of one or more inputs via the user interface.

17. A method executed by a computing device, the method comprising:

while serving as a controller for a networked media playback system comprising a first zone player and at least two other zone players, wherein the first zone

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player is operating in a standalone mode in which the first zone player is configured to play back media individually;

receiving a first request to create a first zone scene comprising a first predefined grouping of zone players including at least the first zone player and a second zone player that are to be configured for synchronous playback of media when the first zone scene is invoked; based on the first request, i) causing creation of the first zone scene, ii) causing an indication of the first zone scene to be transmitted to the first zone player, and iii) causing storage of the first zone scene;

receiving a second request to create a second zone scene comprising a second predefined grouping of zone players including at least the first zone player and a third zone player that are to be configured for synchronous playback of media when the second zone scene is invoked, wherein the third zone player is different than the second zone player;

based on the second request, i) causing creation of the second zone scene, ii) causing an indication of the second zone scene to be transmitted to the first zone player, and iii) causing storage of the second zone scene;

displaying a representation of the first zone scene and a representation of the second zone scene; and

while displaying the representation of the first zone scene and the representation of the second zone scene, receiving a third request to invoke the first zone scene; and based on the third request, causing the first zone player to transition from operating in the standalone mode to operating in accordance with the first predefined group-

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ing of zone players such that the first zone player is configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player.

18. The method of claim **17**, further comprising: while the first zone player is configured to coordinate with at least the second zone player to play back media in synchrony with at least the second zone player, receiving a fourth request to invoke the second zone scene; and

based on the fourth request, causing the first zone player to (a) cease to operate in accordance with the first predefined grouping of zone players such that the first zone player is no longer configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player and (b) begin to operate in accordance with the second predefined grouping of zone players such that the first zone player is configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player.

19. The method of claim **17**, wherein causing storage of the first zone scene comprises causing storage of the first zone scene at a location other than the computing device, wherein causing storage of the second zone scene comprises causing storage of the second zone scene at the location other than the computing device.

20. The method of claim **19**, wherein the location other than the computing device comprises a zone player of the first predefined grouping of zone players.

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